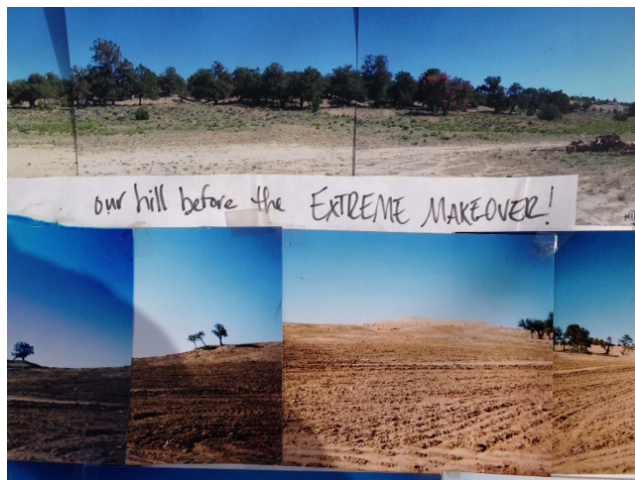




Looking Within:

A Health Impact Assessment of Uranium Mining



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I. Executive Summary

Overview

The Church Rock mining area of Northeast New Mexico crosses the boundaries of McKinley County and the Navajo Reservation. This small area has been dealing with the aftermath of a long legacy of uranium mining, including in the late 1970s the infamous “Church Rock Tailings Spill”—the second largest accident releasing radioactive materials in United States history. Contained within this small area are two mines and a mill site—the Quivera mine and the North East Church Rock (NECR) mine—and the United Nuclear Corporation (UNC)’s mill site. The combined proximity to residences, toxicity of the sites, pathways of exposure to workers and residents and lack of or slow clean up of these facilities has been a concern for residents since learning of the potential toxicity of uranium and the by-products of its mining and milling.

Despite Navajo Nation’s efforts to curtail mining, milling and the transport of uranium through the region (**Appendix 2**), McKinley County has taken historical actions to suggest an interest in uranium mining and efforts have been put forth on the Navajo Nation to reopen uranium mining in the region. As a result, *McKinley County PLACE MATTERS* has conducted this Health Impact Assessment to explore the potential health impacts of additional studies on uranium mining and milling in McKinley County. Specifically focusing its analysis on the effects of additional studies related to environmental exposures/contamination, displacement and relocation, and cultural relevance of the land and community efficacy. ***We hope to advocate for additional time to analyze the potential health effects of the existing facilities as well as require extensive cleanup of existing contaminated areas and homes within McKinley County prior to permitting future mining of the area.*** Below is a summary of the primary findings of the HIA and its recommendations.

Demographics of McKinley County

- The county population is approximately 71,492 with a majority (76%) of American Indian and Alaska Natives.
- The county has a larger proportion of younger aged populations (5-14 and 15-24 year olds) compared to the state overall with 42.8% of children under the age of 18 living in poverty during 2010.
- The poverty rate in the Navajo Nation portion of McKinley County is high, with almost 39% of individuals living in poverty.

Health Conditions of McKinley County Residents

- McKinley County residents have higher rates of stomach, kidney, renal and pelvis cancer than the overall populations of both New Mexico and the U.S.
- In general, Native Americans have higher mortality rates for liver, stomach, kidney, and gallbladder cancer compared to Whites.

Environmental Contamination and Pollution

- The U.S. Environmental Protection Agency (U.S. EPA) is able to estimate that there are approximately 520 Abandoned Uranium Mines (AUM) and 5 uranium mill sites on the Navajo Nation and of those, in McKinley County alone there are an estimated 120 AUM, of which 80% (n=96) are on Navajo lands.
- With the historical impacts of the 1979 Church Rock Tailings Spill at the UNC mill and the fact that on September 8, 1983 the three AUM and UNC mill area have been declared a Superfund site, this is an area heavily impacted by the history of uranium mining.

- Data from 1989, 2001 and 2013 for the mine areas—the Quivera and NECR mines—shows that groundwater contaminants persist throughout this 24-year period demonstrating the devastating and persistent effect of uranium mining on the quality of groundwater in the area, including levels of heavy metals and uranium exceeding U.S. EPA’s levels.
- There are an estimated 155 acres of uranium waste material above safe levels near the NECR mine with some areas having more than 25 times what is considered safe.
- Despite hundreds of AUM scattered throughout the area, remediation efforts have only been initiated in select sites.
- The U.S. EPA estimates that the future costs for cleanup of priority mine sites to be in the hundreds of millions of dollars, thus given current funding levels, it would take U.S. EPA 105 years to fund the removal actions at just 21 of the highest priority mines.
- The existing occupational and non-occupational health studies, which have been conducted, suggest impacts to the health of residents include higher levels of lung cancer, kidney disease and other chronic health conditions (cardiovascular disease and diabetes, for example).

Impacts of Additional Studies on Environmental Contamination and Pollution

- Should more time be required for additional studies of health effects, further study could be conducted to better understand the health impacts of living near AUM.
- More time would further allow for the cleanup of existing AUM to be prioritized prior to the onset of new mining and exploration.
- Allow the community time to begin to recover from the existing environmental contamination and pollution from the abandoned AUMs in the area.

Displacement and Relocation

- There is a long and difficult history of relocation for the Navajo peoples, which is re-emerging relative to the relocation for cleaning up AUM.
- Five cleanup actions are underway for uranium mine sites within the HIA study area, and as a result over 70 people have been temporarily displaced or relocated.
- There is a high likelihood that more residents will be required to move to temporary housing during future cleanup activities, severely disrupting the daily lives of residents and causing a cascade of effects, health and otherwise.
- Currently, the expected date for clean up completion for the NECR mine is 2018 or later—four or more years beyond what was originally projected, with U.S. EPA officials acknowledging that this is an optimistic timeline. This combination of long delays and overall long time periods for removal and remediation would, thus, require people to be displaced, in some cases permanently, and in other cases continuously and for longer periods during the cleanup process.

Impacts of Additional Studies on Displacement and Relocation

- Even with requesting additional health studies, relocation will still likely be required as part of the required AUM cleanup efforts that are currently ongoing. However, requiring additional time to understand the health impacts would reduce the need for *future* relocation, and thus avoid associated adverse impacts to health.

Cultural Relevance of the Land and Community Efficacy

- The goal of Navajo people is to achieve balance and harmony between humans and nature and they view uranium mining as disrupting the balance of earth and sky
- Many of the challenges of trust building and community engagement come from a lack of trust originating from a long history of dishonesty by the U.S. government and a lack of effort to overcome this history—a lack of community efficacy—and from feelings of injustice.
- Community efficacy is built through participation in common activities, shared understandings and values, successful experience of working together where perseverance has been exercised, partnerships between government and non-government organizations, and long-term aims that overlap the goals of diverse groups and reflects the level of social trust in civic institutions.

Impacts of Additional Studies on Cultural Relevance of the Land and Community Efficacy

- Further understanding the impacts on mining in McKinley County would be a first step towards achieving balance and building trust with impacted residents and would be an acknowledgement of the devastating consequences of uranium mining, enabling the healing to begin through thoughtful, conscientious clean up efforts to existing impacts.
- By engaging the McKinley County residents in the process of policy making and the acknowledgment of their concerns by requiring further health studies on uranium mining, community efficacy increases.
- By engaging in studies to assess the public health, economic and environmental impacts of uranium mining on McKinley County and its residents, community efficacy would also improve in that residents would begin to be engaged in/feel part of the overall process of decision-making about their land.

Recommendations

The findings of this Health Impact Assessment demonstrate that further understanding of the impacts of uranium mining, including time for further study of the public health, economic and environmental impacts, would:

- Improve/decrease environmental contamination and pollution for the region;
- Have no effect on the amount of current displacement and relocation for cleanup efforts for AUM, but decrease the potential for a need for *future* displacement and relocation should uranium mining be allowed to continue; and
- Improve cultural relevance to the land through improved community efficacy.

As a result, decision-makers should:

1. Require further health studies to be conducted on uranium mining with adequate funding support.

II. Introduction and Geographic Scope

A. History of Church Rock Uranium Tailing Spill and the Red Water Pond Road Community

In July 1979 at the United Nuclear Corporation's (UNC) uranium processing mill in Northwest New Mexico, a dam broke releasing more than 1,100 tons of uranium mining waste—"tailings"—along with 100 million gallons of radioactive water into the Pipeline Arroyo and downstream into the Rio Puerco. The "Church Rock Tailings Spill" is the second largest accident releasing radioactive materials in United States history.¹ The community adjacent to this spill, the Red Water Pond Road Community, has lived with the impacts of uranium mining and milling—the process of extracting uranium from mined uranium ore—since the 1960s. The Red Water Pond Road Community is circled in red in **Figure 1** below.²

Figure 1: Map of the Geographic Scope of the HIA

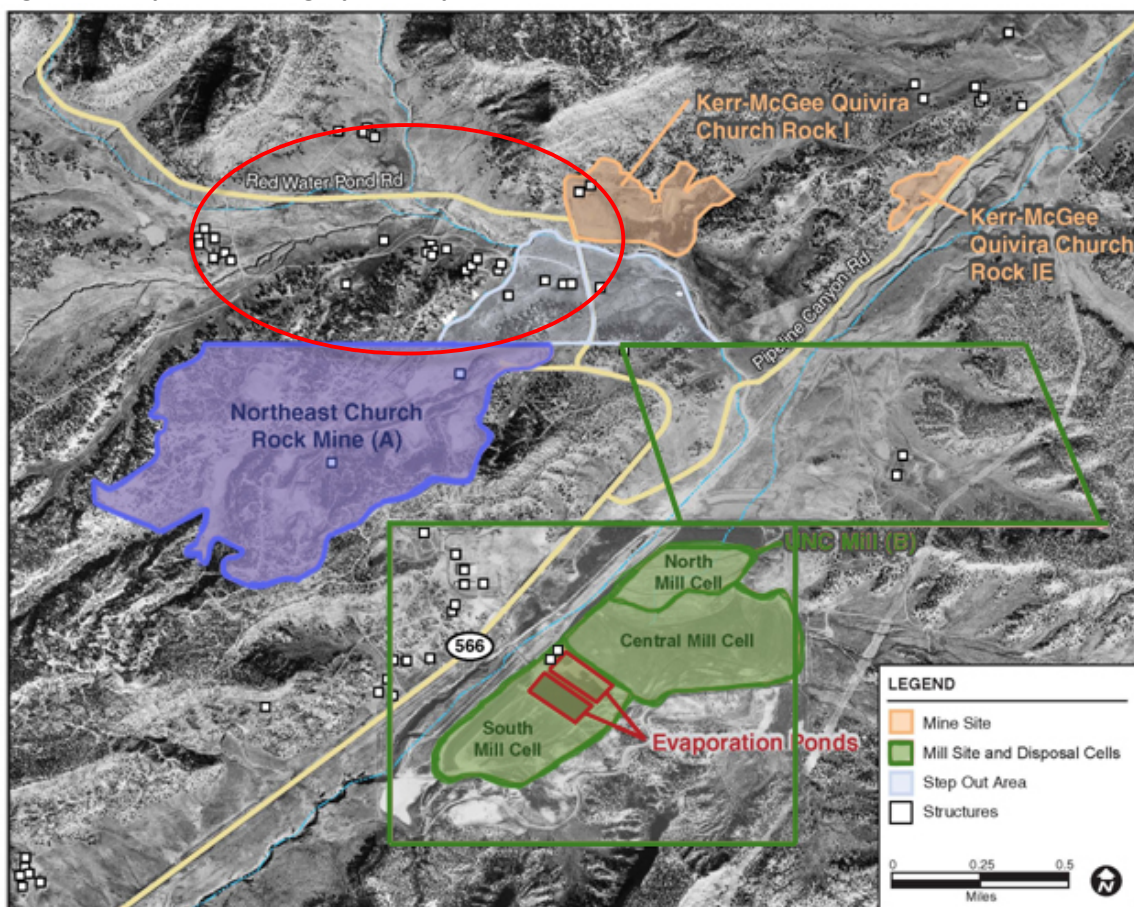


Figure 1: Northeast Church Rock Mine and United Nuclear Corporation site map

The Red Water Pond Road Community Association is a grassroots organization of Diné (Navajo) families who have experienced and lived with the impacts of uranium mining and milling in the Church Rock mining area since the 1960s. Hózhó is how the community lives their lives, meaning maintaining balance, beauty and harmony between them, the five-fingered people, and nature.

¹ New Mexico Office of State Historian, retrieved on October 18, 2013, http://www.newmexicohistory.org/filedetails_docs.php?fileID=24161

² U.S. Environmental Protection Agency. Retrieved from: http://www.U.S.EPA.gov/Region6/6sf/newmexico/united_nuclear/index.html

When this balance is disturbed, their way of life, their health and their well-being all suffer. This hózhó has been disrupted over the years because of the health impacts from working in or living in close proximity to the mines or milling sites culminating from the 1979 Church Rock Tailings Spill. As a result, the Red Water Pond Road Community is focused on restoring and seeking long-term protection of the land and water contaminated by uranium mining, improving the health of community members, and preserving the natural and cultural environment in their area for their families and future generations.

Uranium is a naturally occurring radioactive heavy metal found in mineral deposits, which has been found in small amounts of rock, soil, groundwater, air, plants, and animals. Exposure to uranium can potentially cause tremendous detrimental effects on those who come in contact with the metal by living in close proximity to uranium mines or milling sites, working in the mines, and being exposed to contaminated areas.³ Beginning in the 1940s, the Secretary of the Interior, the Navajo Nation, and the Bureau of Indian Affairs (BIA) issued leases and permits to private companies for uranium mining on the Navajo reservation to develop the country's first atomic bomb and meet the demand for production of the U.S. nuclear weapons stockpile. From 1947 to 1965, the U.S. government's Atomic Energy Commission (now the Department of Energy, or DOE) established financial incentives for the discovery and production of uranium, including a guaranteed minimum price for uranium ore and financial bonuses for uranium ore mined from previously unidentified sites. Additionally, the Commission provided infrastructure support to survey mines and transport ore. However, in 1970 with the decline in the federal government's demand for this heavy metal, uranium on the Navajo Nation was sold exclusively to the commercial sector for use in nuclear power plants. In 1986, uranium operations on the Navajo Nation ceased as a result of price decreases throughout the 1980s.⁴ Between 1948 through 1986, the United States Environmental Protection Agency (U.S. EPA) estimates that nearly 4 million tons of uranium ore was extracted from mines under lease from the Navajo Nation.⁵ When active uranium mining on the Navajo Nation ceased in 1986, private companies abandoned the mines and made few attempts to clean up the contamination or post danger signs for local residents or anyone on the land.^{ibid}

In 1983, the U.S. EPA determined that the UNC uranium mill be placed on the National Priority List of the U.S. EPA's Superfund investigations and cleanup efforts. In 2005, Navajo Nation officials requested the U.S. EPA take the lead on the investigations and cleanup efforts for the North East Church Rock Mine (NECR) Site, which resulted in its declaration of a Superfund Site as well.⁶ The NECR is now one of U.S. EPA's highest priority abandoned uranium mine (AUM) for cleanup in McKinley County and on the Navajo Nation. In 2007, Red Water Pond Road residents living within 500 feet of the NECR were informed that they would have to temporarily move while the U.S. EPA removed radioactive soil from around their homes. Responding to concerns that other community members living within close proximity to the UNC mill had about relocation and the effects of mining on the community more generally, the Red Water Pond Road Community Association was founded. The Red Water Pond Road Community Association has a strong connection to the land with many families having lived in the area for over seven generations--long before uranium mining began here. Not only do members of this community suffer from ill

³ New Mexico Department of Health, 2011

https://nmtracking.org/media/cms_page_media/14/Uranium_Fact_Sheet_DOH_ED_03.22_2.pdf

⁴ Brugge D, Goble R (2002). The History of Uranium Mining and the Navajo People. *Am J Public Health* 92(9):1410-1419.

⁵ Government Accountability Office. (2014). *Uranium Contamination: Overall Scope, Time Frame & Cost Information is Needed for Contamination Cleanup on the Navajo Reservation*

⁶ U.S. Environmental Protection Agency: Northeast Church Rock Mine. Retrieved from: <http://yosemite.U.S.EPA.gov/r9/sfund/r9sfdocw.nsf/ViewByU.S.EPAID/NNN000906132>

health from working in the mines, many individuals struggle with environmentally induced post-traumatic stress syndrome and post-traumatic stress disorder from their experiences living in the contaminated area and dealing with the slow and arduous cleanup process. Despite recognition that these mine and mill sites require substantial and long term clean up to mitigate the existing effects of uranium mining to the area, to date, it must be recognized that there has been inadequate cleanup of *existing* AUM facilities.

There is a long history of the effects of uranium mining on the people of the Navajo Nation, including in McKinley County, as outlined in detail in **Appendix 1**. Of particular importance are the steps that Navajo people have taken to hold the federal government and mining companies responsible for the cleanup of uranium contamination and the poor health of their families. ***In response to widespread uranium contamination on the Navajo reservation, the Navajo Nation passed two laws: the Diné Natural Resources Protection Act of 2005, which began banning uranium production on any site within the tribe's territorial jurisdiction; and the Radioactive Materials Transportation Act of 2012 which began banning the transportation of uranium ore or radioactive waste through lands under the tribe's territorial jurisdiction.*** (To read each of these laws, see **Appendix 2**.) Undoubtedly, these laws have served to prevent further uranium contamination and exposure to uranium and its by-products, and additional costs associated with the cleanup of future mine sites on the Navajo reservation. Similar laws, outside of the Navajo reservation, for example McKinley County more broadly, would likely do the same.

B. Description of Requesting Additional Health Studies

Despite the long history of devastating impacts from uranium mining, in December of 2006, McKinley County Commissioners passed a resolution supporting the exploration of uranium mining within the confines of the county. This is the only resolution within the area supporting future mining efforts.

Given the historical lack of attention to the health risks associated with uranium mining, the years of impacts to McKinley County—including Navajo Nation lands—and the devastating existing environmental contamination in Northwest New Mexico, a Health Impact Assessment (HIA) was proposed by McKinley Community PLACE MATTERS as a way to analyze how additional health studies on uranium mining in McKinley County could affect the health of the County's communities. When a new mining site is proposed, thorough analysis of the potential environmental impacts of the project must be conducted, making up the Environmental Impact Studies. Within these studies, health impacts to the local community are a mere fraction of what is included in the analyses. Given that the aforementioned uranium mines and mills (**Figure 1**) as well as newly proposed sites are located within the boundaries of McKinley County, by conducting this analysis the authors wish to ensure that decision-makers are made aware of the *existing* and *potential* health risks of the uranium mining activities in the area.

More health studies would allow for additional time to analyze the potential health effects of the existing facilities as well as provide time for extensive cleanup of existing contaminated areas and homes within McKinley County prior to permitting future mining of the area.

C. The Purpose and Focus of this Health Impact Assessment (HIA)

The purpose of this HIA is to analyze the health impacts of requesting additional studies for any future McKinley County uranium mining would have on the following health determinants:

1. Environmental exposures/contamination
2. Displacement and relocation
3. Cultural relevance of the land and community efficacy

This HIA assessment focuses on impacts to residents living primarily in the Red Water Pond Road Community, Church Rock, and Manuelito. Church Rock is a Census Designated Place within the Navajo Nation located in McKinley County, has a population of approximately 1,882 people and is home to the four facilities that are the focus of this HIA because of the devastating “Church Rock Tailings Spill”: NE Church Rock mine, two Kerr-McGee - now Quivera mines as well as the UNC mill (**Figure 1**). Many people in the area are unaware of the significance of the Church Rock tailings spill. Although two major health studies have been pursued and supported by federal funding, this HIA explores the comprehensive health impacts of uranium mining and milling, which have not been well researched. In addition, there have been limited discussions about the potential occupational, community and individual health and environmental risks associated with future mining efforts. In conducting this HIA, the authors intend to ensure that the impacts of uranium mining on the health of all communities in McKinley County are prioritized in decision-making processes.

This HIA brought together a diverse group of stakeholders in order to aid decision-makers in their task of deciding on future mining activities within McKinley County. The HIA addresses health broadly and is culturally sensitive rather than limiting its scope to only physical or disease related impacts. The HIA aims to elevate the voices of community members directly impacted by past and potential future mining efforts and provide decision makers with useful information about health disparities within the community and area. The document also lays out key recommendations to take into consideration related to additional studies on uranium mining in McKinley County.

III. Methodology

The process for conducting this HIA involved engaging a group of key stakeholders in identifying the priority health determinants that would be impacted by conducting additional studies on uranium mining in McKinley County (environmental exposures/contamination, displacement and relocation, cultural relevance of the land and community efficacy). The HIA team conducted a review of the literature investigating the links between these health determinants and health outcomes, and gathered secondary data to describe conditions related to these areas of focus on the ground in McKinley County. It should be noted that due to the small geographic area being assessed in this HIA, most data gathered and discussed is at the county level (McKinley). Further, it is important to mention that throughout the report McKinley County includes a significant portion Navajo Nation land.

Primary data collected as part of this HIA included 18 one-on-one interviews with local community residents and one focus group. Community meetings were offered at four Chapter houses, Navajo communal meeting places, to inform people about the HIA. From these meetings, the HIA team engaged interested participants willing to participate in a focus group or interview in order to

collect information from people about their experiences. To see the interview guide and questions for the primary data collection efforts, see **Appendix 4**.

IV. Background

A. Demographics of the HIA Study Area

McKinley County Today

McKinley County, New Mexico, located in the Northwest corner of the state, is a rural area along the Arizona border and includes part of the Navajo Nation. (Footnote includes a detailed and interactive map of the County that shows portions of the Navajo Nation.⁷) The county is sparsely populated, spanning 5,450 square miles with only 13.1 residents per square mile.⁸ According to U.S. Census Data from 2010, the county population is approximately 71,492 with majority (76%) of which are American Indian and Alaska Natives (**Table 1 below**). The county has a larger proportion of younger aged populations (5-14 and 15-24 year olds) compared to the state overall.⁹ The median household income for McKinley County in 2013 was approximately \$30,458 with 35% of McKinley County residents living below poverty level.¹⁰ According to the New Mexico Indicator Based Information System, **there were 42.8% of children under the age of 18 living in poverty during 2010.**¹¹

McKinley County contains within it a portion of Navajo Nation. There is a population of approximately 181,656 in the entire Navajo reservation and 10,580 of these residents live in the Navajo Nation Census County Division of McKinley County (part of the HIA focus area). Of these residents, 91% identify as members of the Navajo Nation tribe. **The poverty rate in the Navajo Nation area of McKinley County is high, with almost 39% of individuals living in poverty** (as compared with 35%, 20%, and 15% of individuals living in poverty in McKinley County, New Mexico, and the U.S., respectively [**Table 1**]).

Table 1. Population Characteristics

| | Navajo Nation Reservation and off-Reservation Trust Land, AZ, NM, UT ¹² | Navajo Nation CCD, McKinley County, NM ¹³ | McKinley County, NM ¹⁴ | New Mexico | United States ¹⁵ |
|------------------|--|--|-----------------------------------|-------------------------|-----------------------------|
| Total Population | 181,656 | 10,580 | 71,492 | 2,059,179 ¹⁶ | 308,700,000 |
| American | 171,120 | 10,074 | 53,988 | 193,222 | 2,932,248 |

⁷ McKinley County, NM and Navajo Nation Chapters and Road Map. Retrieved from:

<http://www.co.mckinley.nm.us/pdf/gisc%20pdf%20files/Navajo%20Nation%20Chapter%20Boundaries.pdf>

⁸ United States Census Bureau State and County Quick Facts. Retrieved from: <http://quickfacts.census.gov/qfd/states/35/35031.html>

⁹ New Mexico IBIS (2013). Retrieved from: <https://ibis.health.state.nm.us>

¹⁰ United States Census Bureau State and County Quick Facts. Retrieved from: <http://quickfacts.census.gov/qfd/states/35/35031.html>

¹¹ New Mexico Information Based Indicator System, McKinley County. Retrieved from:

<http://ibis.health.state.nm.us/view?xslt=html/community/snapshot/report/ReportPage.xslt&xml=community/GeoCnty.xml&community=31&indicatorSetName=AllIndicators>

¹² United States Census Bureau : 2013 American Community Survey 1-Year Estimates. Retrieved from:

<http://www.census.gov/acs/www/>

¹³ United States Census Bureau: 2009-2013 American Community Survey 5-Year Estimates. Retrieved from:

<http://www.census.gov/acs/www/>

¹⁴ United States Census Bureau: 2010 Census Summary File 1. Retrieved from: <http://www.census.gov/>

¹⁵ United States Census Bureau 2010 Census Brief. *The American Indian and Alaska Native Population: 2010*.

¹⁶ United States Census Bureau. Retrieved from: http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

| | | | | | |
|--|----------|---------------------|----------|----------|-------------|
| Indian/Alaska Native ¹⁷ | | | | | |
| % American Indian/Alaskan Native | 94.2% | 95.2% | 75.5% | 9.4% | 0.9% |
| Navajo Tribal Grouping | 153,666 | 9,645 | 40,798 | 108,306 | 295,016 |
| % Navajo Tribal Grouping | 84.6% | 91.2% | 57.0% | 5.26% | 0.09% |
| Total Housing Units | 68,073 | 4,104 | 25,762 | 901,388 | 132,057,804 |
| Median Household Income in past 12 months (in 2013 inflation-adjusted dollars) ¹⁵ | \$25,269 | \$29,272 | \$30,458 | \$44,927 | \$53,046 |
| Poverty status | 38.0% | 38.6% ¹⁸ | 35.0% | 20.4% | 15.4% |

Educational attainment rates are low in McKinley County as compared to other New Mexico counties and nationally with only 11% of the population obtaining a bachelors degree.

Historically, communities of color such as Diné residents of McKinley County have been impacted by colonization and institutional racism, which are the result of policies and practices used to assimilate people into Western cultural practices. This has left a devastating community blueprint marked with poverty and multiple health disparities. ***There are few culturally sensitive resources in the area to support the issues that residents face as a result of perpetuated discrimination. This has created a foundation of social norms that keep people divided and unable to join forces for systematic change to benefit the entire community.*** Because McKinley County is multijurisdictional, the cultural relevance and traditional practices of Diné residents are not always fully understood by fellow community members and decision-makers.

Healthy land produces healthy crops. Healthy vegetation produces healthy livestock. It benefits our communities to have healthy farmland. In return, it also gives us a healthy lifestyle for our community. To me, that has never been addressed. I don't think people, decision makers, don't think of it that way. Our lifestyle is pasture and we depend on our livestock to make that livelihood. All the way around and to some extent we depend on farming.
--Resident

Existing Health Conditions

Heart disease, cancer, diabetes and kidney disease are among the top ten leading causes of death for New Mexicans, including Native Americans living on reservation land. ***In general, Native Americans have higher mortality rates for liver, stomach, kidney, and gallbladder cancer compared to Whites.***¹⁹ (See Figures 2, 3 and 4 below.) ***McKinley County residents have higher rates of stomach, kidney, renal and pelvis cancer than the overall populations of both New***

¹⁷One race-American Indian and Alaska Native - American Fact Finder. Retrieved from: http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

¹⁸United States Census Bureau. Retrieved

from: http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_5YR_DP03&prodType=table

¹⁹ Navajo Epidemiology Center, 2004.

Mexico and the U.S. For McKinley County and the State of New Mexico data, Native Americans exhibit higher rates of both kidney and renal pelvis cancers than White or Hispanic populations.

Figure 2: Cancer Incidence Rates per 100,000 (2007-11)²⁰

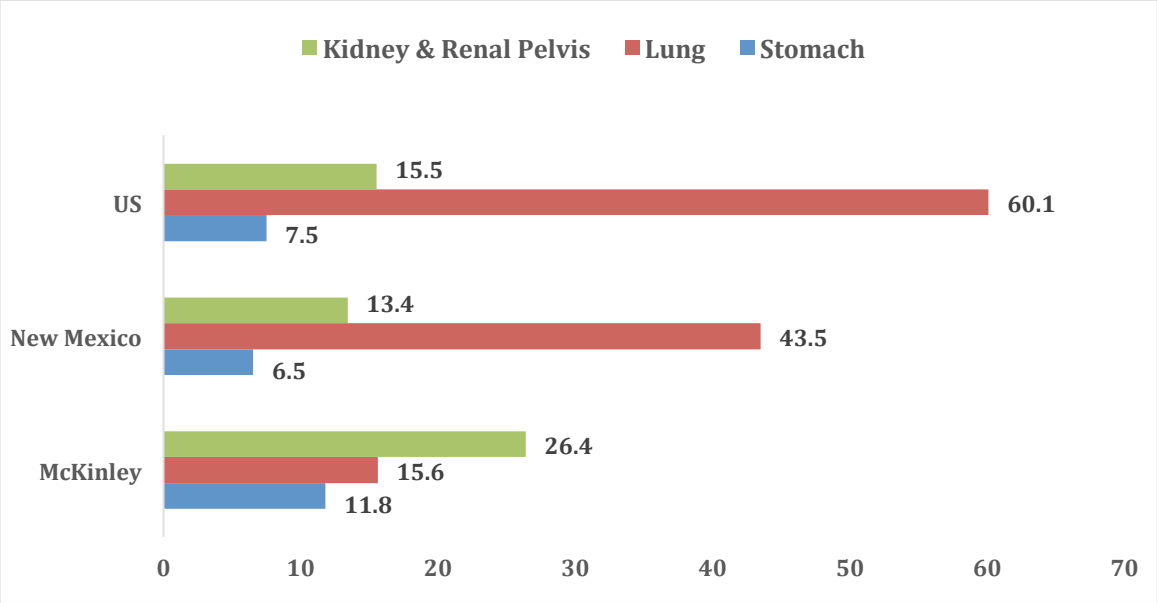
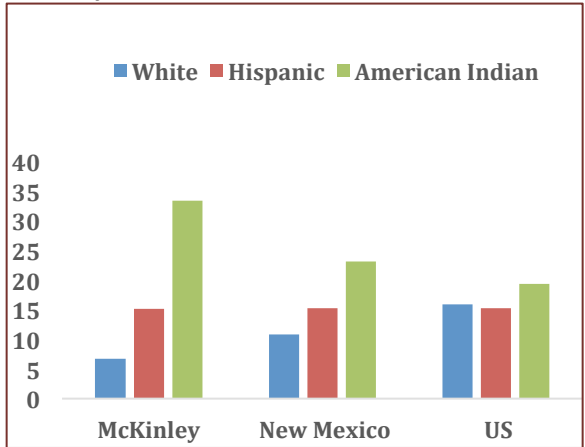


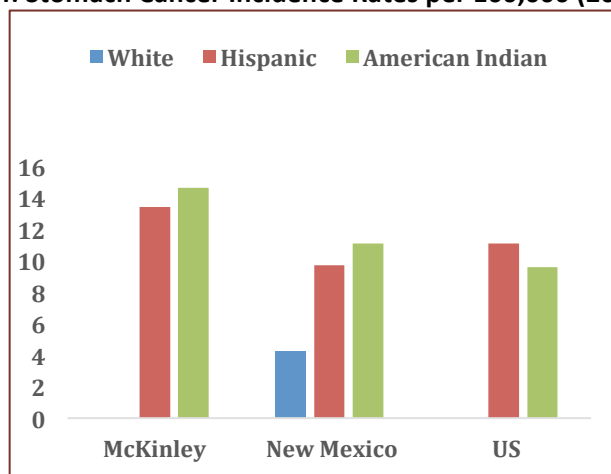
Figure 3: Kidney and Renal Pelvis Cancer Incidence Rates per 100,000 (2007-11)²¹



²⁰ McKinley and New Mexico: New Mexico Tumor Registry. US: National Cancer Institute, http://surveillance.cancer.gov/statistics/types/race_ethnic.html

²¹ McKinley and New Mexico: New Mexico Tumor Registry. US: National Cancer Institute, http://surveillance.cancer.gov/statistics/types/race_ethnic.html

Figure 4: Stomach Cancer Incidence Rates per 100,000 (2007-11)^{ibid}



V. Environmental Contamination and Pollution

A. History of Uranium Mining in McKinley County/on Navajo Lands

During the uranium mining boom mines and mills were a lucrative source of income for Navajo people. However, workers were not informed of the potentially hazardous effects of exposure to the radioactive materials they were milling or mining.⁴ Navajo mine workers, their families, and community members who lived in close proximity to uranium mine sites would drink from and wash themselves with contaminated water as well as use contaminated materials to build their homes and corrals for their livestock.²²

The air pollution, the radiation coming from the waste piles that have never been cleaned up, the water contamination, especially the underground water contamination, that's what really concerns me. There's one abandoned waste pile behind my house that still needs to be cleaned up. The old Church Rock mine site, which was part of UNC, which has been purchased by HRI [Hydro Resources, Inc.], that site is still there. It has never been remediated. That concerns me a lot because it is creating, it is emitting radiation, therefore, you got air pollution. –Church Rock Resident

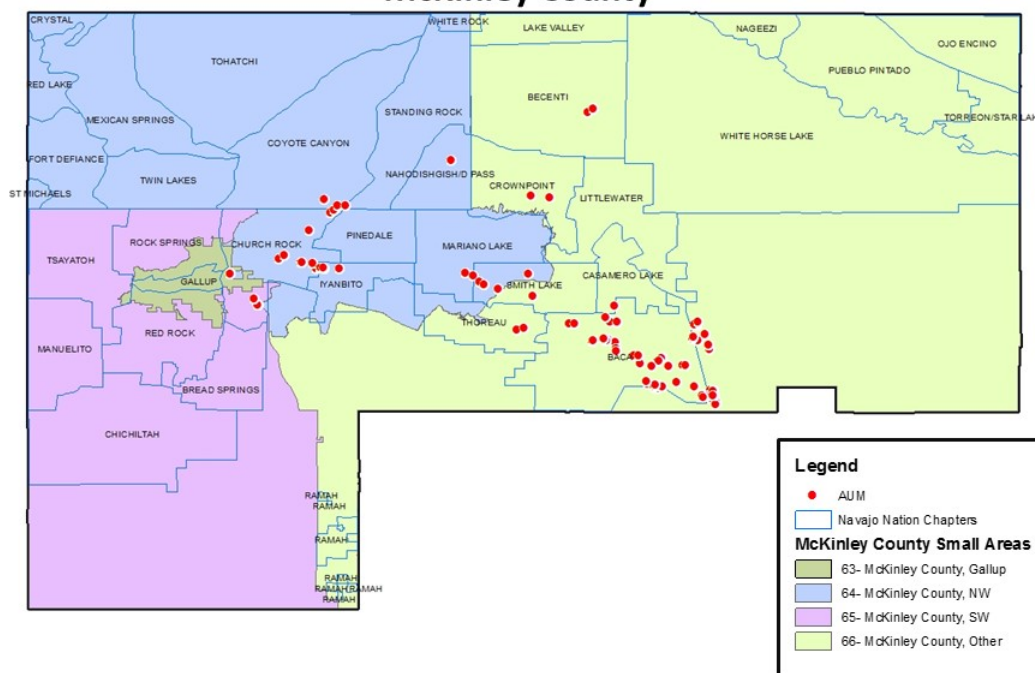
When in the late 1980's demand for uranium ceased, several hundred uranium mines, mills, and waste products were left abandoned and inadequately remediated. Through a screening and assessment process, the U.S. EPA is able to estimate that there are approximately 520 AUM and 5 uranium mill sites on the Navajo Nation and of those, in McKinley County alone there are an estimated 120 AUM, of which 80% (n=96) are on Navajo lands (**Figure 5** below).²³ The uranium mine and mill sites not only pose health threats for people living near them but are also potential sources of air, soil and groundwater contamination. According to Andrew Bain, remedial project manager for the U.S. EPA, some areas near the mine exhibit 800 picocuries per gram of radiation, while 2.24 picocuries per gram of radiation is considered safe.^{ibid} The U.S. EPA estimates that the future costs for cleanup of priority mine sites to be in the hundreds of millions of dollars, thus given current funding levels, **it would take U.S. EPA 105 years to fund the removal actions at just 21 of the highest priority mines.**^{ibid}

²² Markstrom, C. & Charley, P. (2003). *Psychological Effects of Technological/Human-Caused Environmental Disasters: Examination of the Navajo and Uranium*. *Journal of the National Center*, 11(1):19-45

²³ U.S. Environmental Protection Agency (2013). *Federal Actions to Address Impacts of Uranium Contamination in the Navajo Nation: Five-Year Plan Summary*.

Figure 5

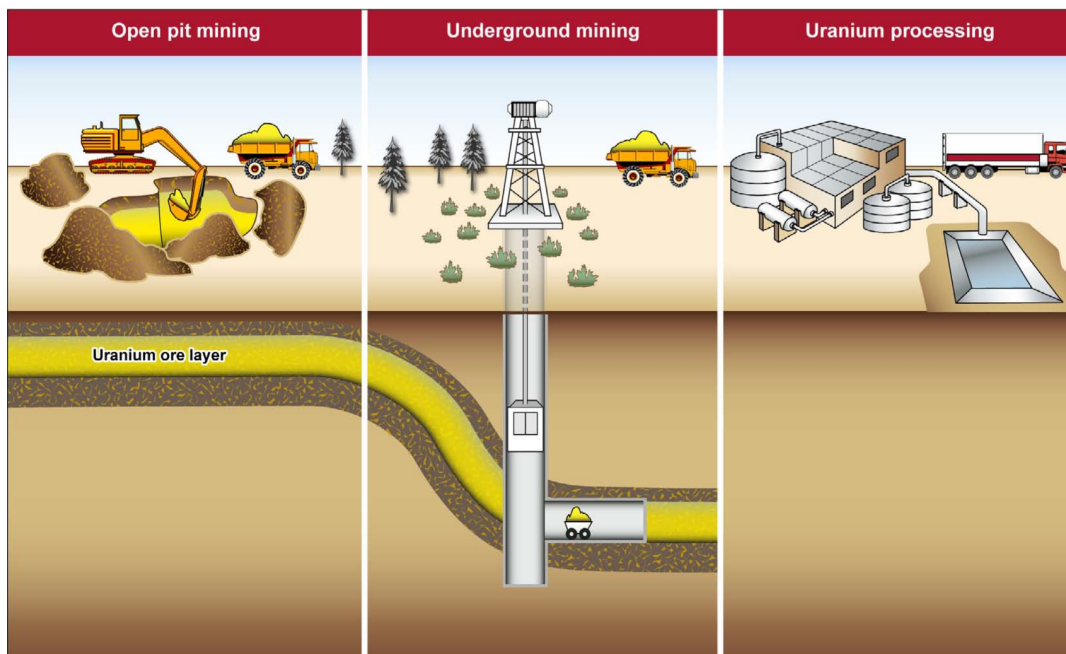
Abandoned Uranium Mines McKinley County



Maps created by New Mexico Community Data Collaborative Staff (<http://nmcdd.maps.arcgis.com/home/>)
 Geospatial data source: Navajo Nation AUM Screening Assessment Report and Atlas with Geospatial Data (available at:
<http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/8ed3f74d2f55b845882573f400787a8e>)

The uranium found on the Navajo reservation is located in sandstone surface outcrops and in deposits more than 4,000 feet deep. Uranium ore was removed from more than 500 mines, through open pit or underground mining. Once mining ceased, companies abandoned the mines and left behind large waste piles containing high levels of radium and radon. Once extracted, ore was sent to mills for processing and crushed and fed to a leaching system that produced yellow slurry called yellowcake. Yellowcake was further processed and used in nuclear weapons. Mill tailings, an output of the leaching process, contained radioactive materials. Mill tailings were mixed with water and placed in unlined evaporation ponds. According to the DOE, leakage of unlined evaporation ponds has contaminated millions of gallons of groundwater.⁵

Figure 6: Uranium Mining and Processing That Occurred on or Near the Navajo Reservation



Sources: GAO; Art Explosion (trees and heavy equipment images).

In a statement given by Larry J. King--a resident in Church Rock living in close proximity to AUM, and a member of Eastern Navajo *Dinés Against Uranium Mining*--to the Congressional Committee for Oversight and Government Reform in 2007, he stated that approximately 20 AUM sites are in the small Church Rock community.²⁴ With the historical impacts of the 1979 Church Rock Tailings Spill at the UNC mill and the fact that on September 8, 1983 the three AUM and UNC mill area have been declared a Superfund site, this is an area heavily impacted by the history of uranium mining. A Record of Decision--a plan to implement remediation--was signed on September 30, 1988.²⁵ UNC was the responsible party for the mill site and submitted a plan of remediation in 1991, which was approved. Still today, the mill site is undergoing a remediation process. **Table 2** below lists the mine and mill sites located in the Church Rock area along with identified contaminants of concern.

Table 2^{ibid}

| | UNC Mill Site | NECR Mine Site | Quivera Mine Sites (2) |
|------------------------------------|---|----------------------------------|------------------------|
| Regulatory Agency | U.S. EPA Region 6 and Nuclear Regulatory Commission | U.S. EPA Region 9 | U.S. EPA Region 9 |
| Potential Responsible Party | United Nuclear Corporation (UNC) | United Nuclear Corporation (UNC) | Rio Algom Mining LLC |

²⁴ Testimony Retrieved from: <http://www.gpo.gov/fdsys/pkg/CHRG-110hhrg45611/html/CHRG-110hhrg45611.htm>

²⁵ U.S. Environmental Protection Agency Region 6 Office. United Nuclear Corporation Mill Site, New Mexico. Retrieved from: http://www.U.S.EPA.gov/earth1r6/6sf/newmexico/united_nuclear/index.html

| | | | |
|---------------------|---|---|---------------------------------|
| Land Owner | United Nuclear Corporation (UNC) | Navajo Indian Trust Land with 40-acres of patented mining claim land owned by UNC | Navajo Indian Reservation |
| Contaminants | Uranium, Radium, gross Alpha and Metals | Uranium, Radium and gross Alpha | Uranium, Radium and gross Alpha |

As part of the reclamation of groundwater contaminants at the mill site, UNC's methods must include extraction of groundwater and treatment by evaporation, which has been ongoing since 1989. Data from 1989, 2001 and 2013 for the three mine areas shows that groundwater contaminants persist throughout this 24-year period demonstrating the devastating and persistent effect of uranium mining on the quality of groundwater in the area, including levels of heavy metals and uranium exceeding U.S. EPA's levels. To view the detailed data see **Appendix 5**.

Although known as early as 1930, the federal government minimized the health risks of uranium exposure throughout the start of the uranium mining boom in the 1940s, undoubtedly due to the high demand for uranium in building the country's arsenal for World War II. In 1949, the Public Health Service undertook the first study of uranium miners and made the decision to not inform them of potential hazards from radiation in the mines for fear of causing alarm. Rather, a study of radiation effects on uranium miners was conducted where causal relationships were confirmed between cumulative airborne radiation exposure and risk of respiratory cancer. Essentially, the federal government violated its trust obligation under the Snyder Act of 1921 by not informing Navajo people of the hazardous working conditions in uranium mines and mills. The Snyder Act of 1921 enacted the Bureau of Indian Affairs shall direct, supervise, and expend moneys appropriated by Congress to benefit, care and assist Native Americans throughout the United States.^{4, 26}

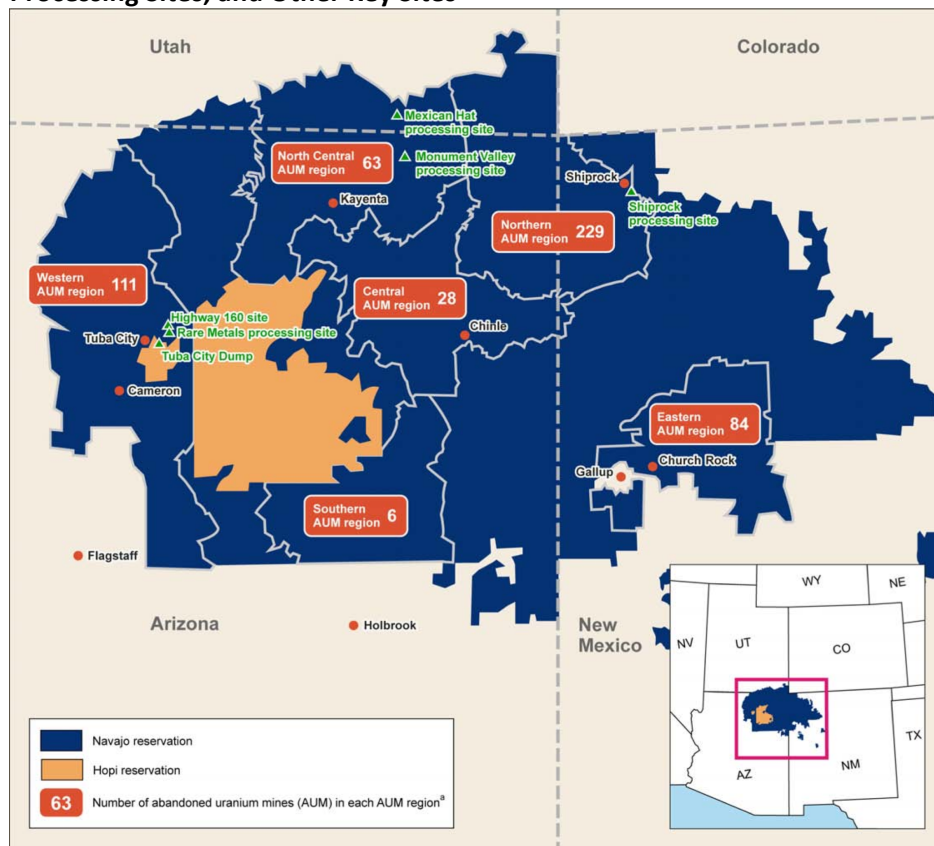
In 1990 and 2000 respectively, Congress passed RECA to provide compensation to uranium miners and their families and EEOICPA to compensate employees having illnesses attributed to production weapons materials and uranium mill cleanup. Additionally, resources to cleanup AUMs listed as priority sites under Superfund have come through the CERCLA law passed in 1980.⁵ In response to wide spread environmental contamination from uranium production, in 2005 the Navajo Nation passed a law that halted uranium mining and processing within the Navajo reservation and also in 2012, the Navajo Nation passed a law prohibiting the transportation of uranium ore or radioactive waste through the Navajo reservation.²³ Despite this, uranium price increases within the past ten years have generated renewed interest in uranium mining on or near the Navajo reservation. In December 2012, a committee of the Navajo Nation Council approved a resolution acknowledging a private company's right-of-way across tribal land near Church Rock, New Mexico and authorized a demonstration project to extract uranium. The Navajo Nation Department of Justice concluded that the resolution was in conflict with the 2005 and 2012 laws.²⁴

²⁶ U.S. Department of the Interior: Indian Affairs. Retrieved from: <http://www.bia.gov/WhoWeAre/BIA/>

B. Existing Conditions of Environmental Contamination and Pollution from Uranium Mining in McKinley County/on Navajo Lands

Today, McKinley County residents/Navajo people continue to live with the environmental and health effects from uranium production with more than 500 AUM being located throughout the Navajo reservation.²⁷ Some of these mines are located close to homes, while others are situated such that they have contaminated drinking water sources. For example, according to Andrew Bain of U.S. EPA, **there are 155 acres, or an estimated 870,000 cubic yards, of uranium waste material above safe levels near the NECR mine with some areas having more than 25 times what is considered safe.** The NECR mine is close to 14 homes and 200 people and poses an unacceptable risk if nothing is done.²⁸ Figure 6 (below) shows the locations of the Navajo and Hopi reservations, and the locations of 521 AUMs

Figure 7: Map of the Navajo and Hopi Reservations with 521 AUM, Four Former Uranium Processing Sites, and Other Key Sites



Sources: GAO analysis of EPA and DOE data; Map Resources (map).

Note: The eastern portion of the Navajo reservation is referred to as the Checkerboard area and consists of land with different ownership and statuses, including tribal trust lands; Indian allotments; Navajo tribal fee lands; and private, state, and federal lands. The Western, North Central, Northern, and Eastern AUM regions extend up to 1 mile beyond the borders of the Navajo reservation.

²⁷ Markstrom C, Charley P (2003). Psychological Effects of Technological/Human-Caused Environmental Disasters: Examination of the Navajo and Uranium. *Journal of the National Center* 11(1): 19-45.

²⁸ Helms (2009). *Northeast Churchrock Mine Cleanup Plan Questioned*. Gallup Independent. August 26th.

Despite hundreds of AUM scattered throughout the Navajo Nation, remediation efforts have only been initiated in select sites. In 2002, the U.S. EPA Region 9 Superfund Program developed a customized Hazard Ranking System to evaluate all known uranium mine sites within the Navajo Nation and prioritized them for reclamation.²⁹ **Table 3** below shows which of the Navajo Nation sites are currently undergoing reclamation or are planned for reclamation according to the U.S. EPA.

Table 3: Cleanup of Abandoned Mines, U.S. EPA Pacific Southwest Region 9^{ibid}

| Mine Site | Navajo Nation Agency | Navajo Nation Chapter | NM County | Action | Status |
|----------------------------|----------------------|-------------------------------|--------------------|-------------------------------------|---|
| Northeast Church Rock Mine | Eastern | Coyote Canyon and Church Rock | McKinley | Cleanup | Third interim action occurred September/October 2012. Cleanup to occur 2016-2020. |
| Mariano Lake Mine | Eastern | Mariano Lake | McKinley | Investigation/Cleanup | Urgent actions have been taken. Investigation ongoing. Evaluation of Cleanup options in 2013. |
| Quivera Mine | Eastern | Church Rock and Coyote Canyon | McKinley | Investigation/Cleanup | Second interim action occurred September 2012. Cleanup to occur 2016-2020. Quivera Mine |
| Skyline Mine | North Central | Olijato | n/a (Utah/Arizona) | Cleanup | Clean up completed October 2011; total cost of \$8M. Skyline Mine |
| Cove Transfer Stations | Northern | Cove and Red Rock | n/a (Arizona) | Cleanup | Investigation complete. Urgent actions occurred October 2012. Cove Transfer Stations |
| Sections 32 and 33 | Eastern | Casamero Lake | McKinley | Cleanup | Investigation ongoing. Urgent actions occurred October/November 2012. Sections 32-33 Abandoned Uranium Mine |
| Ruby Mines 1-4 | Eastern | Pinedale and Smith Lake | McKinley | Negotiations with responsible party | Starting negotiations with responsible party. Urgent actions conducted October |

²⁹ U.S. Environmental Protection Agency Region 9 Office. Addressing Uranium Contamination on the Navajo Nation. Retrieved from: <http://www.U.S.EPA.gov/region09/superfund/navajo-nation/abandoned-uranium.html>

| | | | | | |
|--------------------------------|---------|---------|---------------|-------------------------------------|---|
| | | | | | 2012 |
| 20 Mine Claims in Cameron Area | Western | Cameron | n/a (Arizona) | Negotiations with responsible party | Starting negotiations with responsible party. Site visits conducted September and November 2012 |

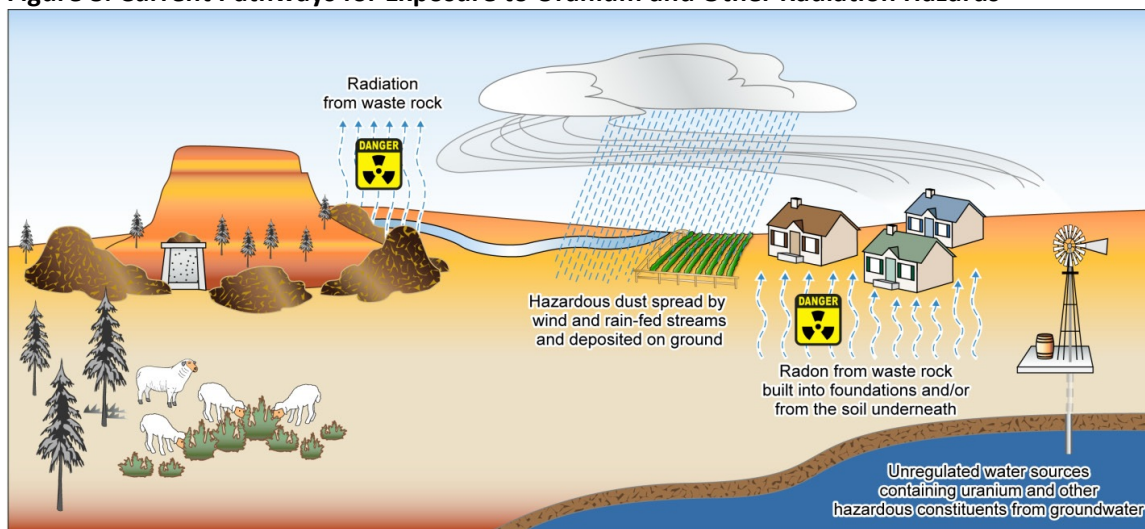
All of this data demonstrates the high risk of the AUM within McKinley County/on Navajo Nation lands and demonstrates the slow process of remediating what is currently impacting the environmental conditions.

C. Environmental Contamination and Pollution from Uranium and Impacts on Health

There is strong evidence about the relationship between both occupational (i.e. working in the mine) and non-occupational exposure (i.e. living near a uranium mine or mill site) to uranium mine or mill sites and increased risks of diseases. Navajo men have constituted a large portion of uranium miners and Navajo families are the largest population indirectly exposed through a variety of pathways: (1) **Ingestion**: drinking water obtained from unregulated water sources such as livestock wells; eating foods that have been cooked with herbs grown on or near mine or mill waste piles; or eating livestock that has fed on contaminated grasslands. (2) **Inhalation**: breathing in dust particles while working in mines; and/or living in homes constructed from mine and mill site wastes. (3) **Dermal exposure**: playing or washing clothes in contaminated streams or streambeds; and/or living, working, or walking near contaminated mine and mill waste piles (**Figure 8**).⁵

A lot of radiation came from the radon that were [sic] present in the water and the water would just be coming out of the rocks. Some people drank that water and then their clothes would be soaked. After each shift, people would come back up, they were asked to take showers, most of them didn't and then they would take their work clothes home, like on weekends, wash, and that's how the family got exposed too. And then the building materials, like lumber, mostly lumber because lumber is porous. It absorbs the water and they took that used lumber out of the mine and they would store it right there near the house and they would dump that lumber there and people could use it for structures, sheep corrals, shacks, whatever. – Red Water Pond Community Resident

Figure 8: Current Pathways for Exposure to Uranium and Other Radiation Hazards



Sources: GAO; Art Explosion (trees and sheep).

In 2007, the Committee on Oversight and Government Reform held a hearing in the U.S. House of Representatives to address uranium contamination in the Navajo Nation. Doug Brugge, M.D., Ph.D., a Professor in the Department of Public Health and Community Medicine at Tufts University School of Medicine, gave a statement regarding the health effects of radioactive materials (including uranium) in which he stated:

Many of them are proven or near-proven to have causal links with health effects. I will list only a few of these. One is radon, which causes lung cancer, and in fact is the primary source of lung cancer among Navajo uranium miners. Two is uranium, which is a heavy metal that causes damage to the kidneys, as you have heard previously; there is also strong evidence that it causes birth defects and may cause changes to the bones as well. Three is radium, which causes bone cancer, cancer of the nasal sinuses and mastoid air cells and leukemia, among other things. And four is arsenic, which causes lung and skin cancer, as well as neurotoxicity, hyper-pigmentation and hyperkeratosis of the skin. There may be many other negative health effects from exposure to uranium and its byproducts. In short, there is a clear causal link between uranium ore exposure and human health. The Navajo people, continually exposed to uranium and its byproducts, even today, face grave threats to their health.³⁰

According to the U.S. EPA, health effects from elevated levels of uranium and other radionuclides include lung cancer, bone cancer, and impaired kidney function.²³ When uranium is ingested through one of its multiple pathways, its decay products including radon, radium, and thorium pose documented health risks such as lung and bone cancer.³¹ (See more in *Occupational Uranium Exposures and Health* below.) New compelling evidence from animal and human studies

³⁰ Testimony Retrieved from: <http://www.gpo.gov/fdsys/pkg/CHRG-110hrg45611/html/CHRG-110hrg45611.htm>

³¹ Arnold, C. "Once Upon a Mine: the Legacy of Uranium on the Navajo Nation." *Environmental Health Perspectives* Volume 122, Issue 2 (2014). Retrieved from: <http://ehp.niehs.nih.gov/122-a44/>

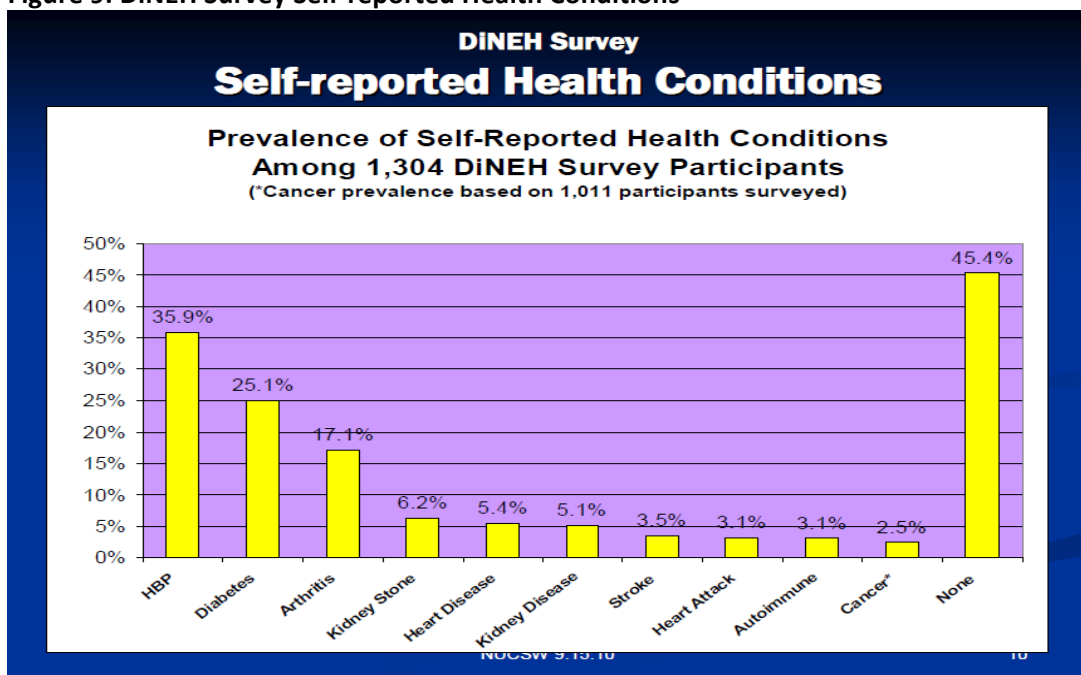
suggests effects of uranium exposure on other organ systems in the body as well, including the kidneys. As Arnold states in her *Environmental Health Perspectives* study,

*Uranium appears to exert its chemical effects on the kidney's proximal tubules. Arsenic and cadmium—which, along with other potentially hazardous metals, are sometimes found in uranium tailings—create similar signatures of metal damage in the kidneys.*³⁰

The chronic inhalation and higher daily intake of uranium-pervaded drinking water is likely a significant contributor to damage of the kidney's proximal tubules. Contact with uranium may potentially irritate the tissue linings, which in turn damage cellular functions within the kidney. ***This potential for increased kidney disease/failure as a result of uranium exposure increases the individual's risk for cardiovascular (heart) disease and hypertension (high blood pressure).***

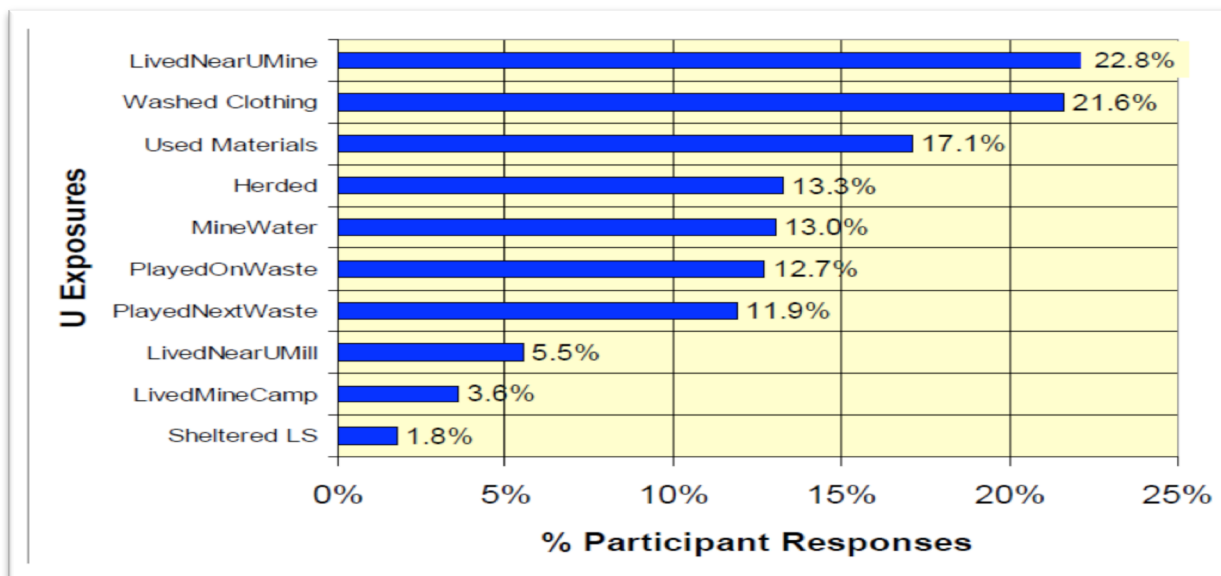
From 2004-2010 the Diné Network for Environmental Health Project (DiNEH), a federally funded project, which studied the health impact of Navajo people living near and/or in close proximity to abandoned uranium mines within the Eastern Navajo Nation Region. Using surveys, medical record reviews, clinical assessments and biomarker analyses to assess the health effects of uranium among active uranium mining exposures in workers and their families, data was collected on 1,304 participants from 20 Navajo Nation Chapters. Information collected related to occupational and environmental exposure to uranium, medical conditions, location of participant home and location of abandoned mines (including features such as waste piles). **Figure 9** (below) shows the DiNEH participants' self-reported health conditions and it is clear that there are high rates of high blood pressure and diabetes, both early indicators of kidney disease (kidney disease causes high blood pressure, and diabetes can cause kidney failure).

Figure 9: DiNEH Survey Self-reported Health Conditions



Of the 1,304 DiNEH participants, 104 were uranium workers with occupational exposures to mines and their contaminants. **Figure 10** (below) shows the diversity of non-occupational uranium mine exposures, and further highlights the interconnectedness of this community's lifestyle with the land, and thus the impacts of uranium mining.

Figure 10: Self-reported Non-Occupational Uranium Exposures Among all DiNEH Participants (N=1,304).



To date, the final data from the DiNEH project has not been released, however *preliminary findings indicate active mining-era exposures (i.e. people worked in a mine, mill site, or reclamation site, lived in a mining camp, and/or washed clothes of a mine worker) predicted an increased risk of kidney disease, as well risk of immune system dysfunction* (i.e. increased in activated T cells).³² Additionally, *environmental legacy exposures such as living near a mine, herding livestock close to a mine site, playing near a mine site, and/or drinking or coming into contact with mining water predicted increased risk of hypertension and autoimmune disease.* Simple close proximity to a mine site was predicative of self-reported health problems.

Occupational Uranium Exposures and Health

According to the Office of Navajo Uranium Workers, an estimated 3,000 Navajo miners and 1,000 Navajo millers worked in the uranium industry. Proper protective clothing and safety measures were not provided, and ventilation to control fugitive dust and radon did not exist. It was common practice to force workers back into the mines immediately after blasting activities, subjecting them to heavy dust, radon, and unstable rocks. Miners ate their lunches while working in the mine and reportedly drank water that dripped from the mine ceilings. Milling activities were equally as dangerous. Millers were subjected to radioactive dust during crushing operations, and to sulfuric acids, sodium chlorate, and solvents from leaching and extraction operations.²⁴

Beginning in the 1960s, efforts were made to obtain compensation for families of deceased uranium miners who had died of lung cancer and other respiratory diseases. The effort continued until 1990 when President Bush signed Radiation Exposure Compensation Act, or RECA, into law.⁴ Compensation under the Act was structured as follows: \$100,000 for uranium miners, millers and ore transporters, \$75,000 for individuals participating in atmospheric nuclear weapons testing, and \$50,000 for individuals who lived or worked downwind of atmospheric tests. As of January 2013, the federal government had approved more than 26,000 claims and had awarded more

³² The Diné Network for Environmental Health Project (DiNEH) preliminary data.

than \$1.7 billion. As of April 2014, 1,347 Navajos had received compensation under RECA for illnesses from occupational radiation exposure as uranium miners, millers, or ore transporters.²³

In 2000, the Energy Employees Occupational Illness Compensation Program Act, or EEOICPA a federal program to compensate nuclear weapons workers who were made ill or their surviving family members by work done in the U.S. nuclear weapons industry beginning in World War II, was passed by Congress allowing for up to \$400,000 in compensation for employees with illnesses related to the production of materials for weapons. The EEOICPA also contain a provision for the compensation of employees involved with the cleanup of uranium mills. As of January 2013, the federal government had paid workers and their survivors more than \$8.8 billion.²³

Several studies have been undertaken to identify the risks to miners from uranium exposure. **Research has found the death rates of Navajo uranium miners was 3.3 times greater than for the U.S average for lung cancer.** Uranium miners were five times more likely to develop lung cancer than the general population.³³ Mulloy found that more than 75% of lung cancer cases occurred among male Navajo miners who have a low incidence of smoking, concluding that “exposures to dust, gases, exhaust, and fumes can result in nonmalignant or malignant respiratory disease in underground miners. In addition to lung cancer, other respiratory diseases included silicosis, pulmonary fibrosis, emphysema, obstructive lung diseases, silico-tuberculosis, and pneumoconiosis”.³⁴

... just being around uranium and knowing now what it does to your health at this time because of this exposure happened about 20 or 30 years ago, right now at this time is when the effects will be seen. I feel like I know it's affecting me already now because I was laid off from UNC in April 1986 that's almost 30 years ago. Now, I'm starting to feel the effects. I have temporary respiratory problem, breathing problem, the doctor that I go see is calling it asthma. –Church Rock Resident

And as I said my grandpa he was affected by lung cancer, I can't say, concrete information that's the reason why he died, or contracted cancer, but I can say that's a high possibility, the uranium spill, plus he was working there. My grandmother was working as security there. At the United Nuclear Mining, I think that's what it is called. She was working security there for many years. Now, she has respiratory problems. She's on oxygen. – Manuelito resident

Non-Occupational Uranium Exposures and Health

With federal funding from Indian Health Service, between 2011-2012 the *Community Uranium Exposures Journey to Healthy Program* conducted twenty-two medical screening events where 699 individuals participated in medical examinations and 578 of these individuals self-identified as having had current or past exposure to uranium through a non-occupational setting. **Self-reported health issues of residents who went through the medical screenings and who lived near AUMs, included (number in parentheses are number of respondents reporting the illness): diabetes (201), headaches (224), high blood pressure (253), eye problems (289), arthritis (183), depression (157), respiratory problems (131), heart conditions (86), anxiety (117), skin rashes (102), miscarriages (68), cancer (57), developmental issues (32), learning issues (72), kidney problems (77), and speech delay (63).**²³ **Table 4 below outlines the documented exposure pathways for these residents.**

³³ Roscoe RJ, Deddens JA, Salvan A, Schnorr TM, Mortality among Navajo uranium miners. *American Journal of Public Health.* 85(4) 535-40, April 1995

³⁴ Mulloy, K. B. (2001). Lung cancer in a non smoking underground uranium miner. *Environmental Health Perspectives,* 109(3), 305-309.

Table 4. Residents Exposure Pathways

| Exposure Pathway | Number of residents having current exposures | Number of residents having past exposures |
|-------------------------------|---|--|
| Water | 44 | 277 |
| Abandoned uranium mines (AUM) | 142 | 123 |
| Structures | 39 | 135 |
| Livestock | 88 | 217 |
| Plants | 72 | 148 |

Several programs listed below were initiated in 2007 to study the impacts of non-occupational uranium exposure on health and to increase the awareness among residents of health hazards associated with uranium contamination. Most of these programs are federally funded and call attention to taking local action to support more in-depth studies about impacts to our McKinley County families and individuals. Many of the studies are focused on basic educational components and physical diseases, yet miss addressing the cultural components relevant to our community members. Further health studies in McKinley County could build on what is currently established to enhance the knowledge and public awareness about the health outcomes and risks associated with uranium mining:

1. **Public Outreach on Water Quality and Health:** a public outreach campaign consisting of: meetings with Navajo Nation Chapter officials, danger sign postings at water sources exceeding drinking water standards, and announcements in the Navajo Times and local radio stations regarding water contamination and health.
2. **Radiation Exposure Screening and Education Program:** a service delivery model for screening and educating individuals who have been occupationally exposed to uranium and its by-products.
3. **Indian Health Service Community Uranium Exposures Journey to Healing Program:** provides residents with medical screening and facilitates community conversations.
4. **Training:** Indian Health Service health providers and Navajo paraprofessionals received training on uranium exposures.
5. **Navajo Uranium Assessment and Kidney Health Project:** assessed the association between drinking water, kidney disease, and diabetes (findings suggest an increase in kidney disease among study participants who were occupationally exposed to uranium).
6. **Prospective Birth Cohort Study:** a current study to assess the potential impact of uranium exposure on pregnant women and infant health. This study is especially important because congenital anomalies remain the leading cause of infant deaths on the Navajo reservation. The infant mortality rate among the Navajo people is 8.5 deaths per 1,000 live births as compared to 6.9 deaths per 1,000 live births in the U.S.²³

Environmental Contamination and Psychological Health

Markstrom makes the case that the overwhelming environmental devastation that occurred from uranium production on the Navajo reservation should be viewed as a human caused environmental disaster. The psychological impacts from human caused disasters can be more severe than natural disasters since natural disasters are evident, and in response, an altruistic community often helps to cope with the aftermath. The most damaging effects of human caused disasters are the psychological scars of the trauma, resulting in a diminished sense of safety. Post-Traumatic Stress Disorder (PTSD) is a common diagnosis in the wake of disasters and accompanies other disorders including anxiety, depression, problems with sleeping, relationship problems, substance abuse, and anger, alienation, mistrust, loneliness, and isolation.²⁴

The uranium contamination legacy on the Navajo Nation has lasted for four decades keeping the issue alive and diminishing the potential for psychological recovery among the Navajo people. From Markstrom's article,

In one of the stories, the Navajos tell about their origin, the Diné emerged from the third world into the fourth and present world and were given a choice. They were told to choose between two yellow powders. One was yellow dust from the rocks and the other was corn pollen. The Dine chose the corn pollen, and the gods nodded in assent. They also issued a warning. Having chosen the corn pollen, the Navajos were to leave the yellow dust in the ground. If it was ever removed, it would bring evil." In part, "the fears and anxiety of the Navajo people in response to the uranium disaster may be linked to their knowledge of the disruption of the earth's elements reflected in the contamination spread through blowing wind."^{ibid}

According to Markstrom, ***psychological impacts of disasters can be organized around the following major themes: 1) human losses and bereavement; 2) environmental losses and contamination; 3) feelings of betrayal by government; 4) fears about current and future effects of contamination and radiation exposure; 5) prolonged duration of psychological effects; 6) anxiety and depression; and 7) the complicating factors of poverty and racism.*** These major themes are particularly relevant in light of "longstanding efforts by miners, millers, and their families to obtain compensation, endless efforts to cleanup environmental contamination with no assurance of resolution in the future, the uncertainty and ambiguity surrounding common concerns for the health and wellbeing of future generations, and recent efforts to resume uranium mining".^{ibid}

D. Impacts of Additional Health Studies on Environmental Contamination and Pollution

The existing conditions in McKinley County, including the area of Navajo Nation, demonstrate the high levels of environmental contamination and pollution due to the overwhelming number of AUM. Although the U.S. EPA has declared them Superfund Sites and/or has designated many of them as high priority for cleanup, remediation of existing facilities has been slow, arduous, and is proving to be expensive. As a result, residents have been and continue to be exposed to uranium through a variety of pathways. The limited health studies shared in this HIA suggest impacts to the health of residents include higher levels of lung cancer, kidney disease and other chronic health conditions (cardiovascular disease and diabetes, for example).

Should additional health studies on uranium mining be enacted in McKinley County, it would also generate the cleanup of existing AUM to be prioritized and encourage a larger body of evidence to

be compiled to understand the effects of uranium mining on the health of residents living adjacent to these AUM prior to the onset of new mining and exploration. ***As a result, it would allow the community time to begin to recover from the existing environmental contamination and pollution from the abandoned AUMs in the area.***

E. Specific Recommendations for Environmental Contamination and Pollution

- Require further health studies to be conducted on uranium mining with adequate funding support.

VI. Displacement and Relocation

A. History of Displacement and Relocation due to Uranium Mining (Mineral Extraction)

It is ironic that lands designated as inhabitable and thus allocated to the Navajo Nation were later found to be rich with natural resources. The disproportionately higher amounts of uranium, oil and gas found on the Navajo Nation were the stimulus for the federal government's historic relocation efforts as depicted below in **Table 5**.

Table 5: Relocation of the Navajo People and Mineral Extraction³⁵

| | |
|----------------------|---|
| 1863 – The Long Walk | Kit Carson launches a brutal and relentless search and destroy campaign against the Navajo people so as to capture them. The U.S. Cavalry sweeps across the Navajo Countryside chopping down fruit trees, destroying crops, and butchering sheep. Thousands of Navajo people are killed and 8,500 Navajo men, women and children are forced to march more than 400 miles during the winter to a 40-square mile reservation, Fort Sumner, in eastern New Mexico. |
| 1909 | The U.S. Geological Survey conducts an investigation in Northern Arizona and estimates that 8 billion tons of recoverable coal reserves lay beneath the surface. |
| 1920 | The Los Angeles Department of Water and Power assesses the feasibility of developing coal resources to provide electricity for the explosive population growth occurring in Southern California. Subsequently, a power plant is located in the Four Corners area so that air quality in Southern California will not be impaired. |
| 1950s | Western Energy Supply comprised of 21 utility companies from AZ, CA, NM, CO, NV, UT, and TX implement the “grand plan” to construct massive coal fired power plants and nuclear power plants which rely on uranium and coal deposits located in the Four Corners area. |
| 1950s – 1970s | Efforts to develop coal and uranium resources lead to the establishment of Navajo and Tribal Councils by the federal government as a means of gaining control. |
| 1974 | The Navajo Hopi Land Settlement Act allows for the division of 1.8 million acres of jointly used ancestral lands, imposes a building moratorium and livestock reduction program for Navajos living on Hopi Partition Land, and results in the relocation of 10,000 – 15,000 Navajo people from their homelands. Passage of the Navajo Hopi Land Settlement Act occurs in response to commercial interests to extract coal and other minerals for the area. The primary commercial interest is Peabody Coal. |

Against this historical backdrop, one can appreciate the Navajo people's distrust, reluctance, and fear surrounding U.S. EPA's efforts to relocate residents during their AUM cleanup efforts. Cleanup efforts for AUM are necessary and expensive, and provide the community its only

³⁵ Lacerenza D (1988). An Historical Overview of the Navajo Relocation. Retrieved from: www.culturalsurvival.org

possible relief to live on the land without worry of additional health impacts resulting from uranium exposure. However, there are impacts and consequences of requiring the relocation of residents during the cleanup of a mine or mill site.

The first stay we stayed for a couple months. First, they only took one family, my aunt's family, and we told them what, what you, how do you, how did you make your decision by just letting those two or three families move. Because we are all exposed to all that area you might have a manmade barrier, like a fence and we told them, manmade barriers, Mother Nature has no regard for that. – Red Water Pond Resident

B. Existing Conditions for Relocation Efforts and Displacement Associated with Uranium Mining

Five cleanup actions are underway for uranium mine sites within the HIA study area; the NECR mine, Mariano Lake, the two Quivera mines, and Ruby mines 1-4 with additional cleanup actions underway for the UNC mill site. The NECR mine in Church Rock has received the highest priority for cleanup by the U.S. EPA due to extremely high levels of radiation and its proximity to homes in the area. Since 2007, the U.S. EPA has remediated seven structures in Church Rock. 70 residents were temporarily displaced in the process, but all returned home by November 2012. It is highly likely that more residents will be required to move to temporary housing during future cleanup activities.²³ These temporary displacements severely disrupt the daily lives of residents and cause a cascade of effects, health and otherwise.

"Was that the first one? Nope, the first one was Becky and us, we went way down by McDonald's on the west side. That's where we stayed and um, it was kind of hard, especially with the kids, you know, catching the bus, we had to take them back and forth to school at that time, they were at Church Rock I said, we're used to the open road and there we're just restricted, all kinds of rules and regulations to come over there and staying in that place and you don't get home meals. At that time we had a real small kitchen, we had pots and pans. And then the second (2nd) one, that Orlean's Manor"
--Resident Red Water Pond Road

Similarly, those who had been asked to temporarily move during 2009 interim cleanup activities had concerns as well, stating, "They're going to move us from the area to Gallup for five months, supposedly. But if the weather sets in – let's say it snows October 1 – they have to move us back home, they have to move their equipment out and then springtime they have to move us out again and they're going to continue the cleanup."²⁵

On the other hand, those who have not been asked to leave their homes wonder if they are being discriminated against and whether they will risk further uranium exposure and ill health from windblown dust generated during the cleanup. There have been multiple cleanups that have taken place and during one of them in 2009, one community resident asked U.S. EPA staff, "What's wrong with us? Why can't we be part of the people that are being moved out?" while another resident, a victim of lymphoma in 2006 and former employee of the Kerr-McGee mine, told U.S. EPA, "Once this cleanup starts we will be the victims of ground disturbance, meaning that dust and contaminants will be in the air. My priority is my children and grandchildren. How are you going to tell us that you're going to keep this highway safe for us to travel?" ^{ibid}

Despite the high risk of exposures, the U.S. EPA failed to meet their target of cleanup at the NECR mine due to: 1) an underestimate of the time needed for a full assessment of cleanup; 2) requirement for consideration of substantial public comments provided to U.S. EPA regarding the removal action alternatives; 3) delays in receiving approval by the Nuclear Regulatory Commission

(NRC) and the DOE to dispose of NECR mine wastes at the nearby UNC mill site, and 4) delays in receiving funding for cleanup.⁵

Currently, the expected date for removal/clean up action completion for the NECR mine is 2018 or later, 4 or more years beyond what was originally projected. U.S. EPA officials, however, acknowledged that this schedule is optimistic. Moreover, although the former operator and potentially responsible party at the NECR mine is taking the lead for the cleanup, ***the government will pay up to 33% of future cleanup costs, which U.S. EPA estimated a total future costs could be \$44 million, while cleanup of priority mining sites is expected to be in the hundreds of millions of dollars.***^{ibid} ***This combination of long delays and overall long time periods for removal and remediation would, thus, require people to be displaced, in some cases permanently, and in other cases continuously and for longer periods during the cleanup process.***

The U.S. EPA estimates that the future costs for cleanup of priority mine sites to be in the hundreds of millions of dollars, thus given current funding levels ***it would take U.S. EPA 105 years to fund the removal actions at just 21 of the highest priority mines.*** It is estimated to take even longer to also address the unknown number of mines without potentially responsible parties that will also need cleanup. The most optimistic timeframe for the completion of the removal action for the NECR mine is 2020.⁵

For more detailed information about existing and ongoing cleanup efforts, the costs and challenges related to the same see **Appendix 6.**

C. Uranium Mining, Relocation of Navajo People, and Impacts on Health

“Relocation” is the term previously used by U.S. EPA for temporarily moving residents during cleanup and it can trigger trauma for Diné people. When historic experiences are significant and negative, they can become embedded into a culture’s collective experience in what is known as historical trauma; a particular kind of trauma that is passed down through generations within communities that have experienced a history of large-scale, catastrophic events.^{36,37,38} It can also be described as the residual, community-level psychological injuries due to collective loss, or as “historical unresolved grief.”³⁶ Building on knowledge of trauma responses and chronic stress, historical trauma researchers have suggested that present-day reminders, or “triggers,” of past traumas can exacerbate the negative psychological effects that historically marginalized communities experience in areas where historical trauma is present. Children and grandchildren of survivors of trauma that themselves experience historical trauma are more likely to have shorter life expectancies, and demonstrate poor physical and mental health outcomes such as anxiety and depression, and trauma symptoms such as hyper-vigilance, distrust, feelings of vulnerability, and psychological distress; all of which can contribute to dysfunctional interpersonal relationships and inhibit healthy development and functioning.^{37,39,40} Chronic stress has several specific detrimental physical health implications, including impairment of the nervous, cardiovascular, and immune systems, and is associated with diabetes, hypertension, and cardiovascular disease.³⁹ Historical trauma has also been associated with increased substance use

³⁶ Brave Heart MYH, Lemyra DeBruyn. The American Indian Holocaust: Healing Historical Unresolved Grief. *Am Indian Alsk Native Ment Health Res J Natl Cent Am Indian Alsk Native Programs*. 1998;8(2):56-78.

³⁷ Mohatt NV, Thompson AB, Thai ND, Tebes JK. Historical Trauma as a Public Narrative: A Conceptual Review of How History Impacts Present-Day Health. *Soc Sci Med*. 2014;106:128-136.

³⁸ Estrada A. Mexican Americans and Historical Trauma Theory: A Theoretical Perspective. *J Ethn Subst Abuse*. 2009;8(3):330-340.

³⁹ Sotero MM. A Conceptual Model of Historical Trauma: Implications for Public Health Practice and Research. *J Health Disparities Res Pract*. 2006;1(1):93-108.

⁴⁰ Brave Heart MYH, Chase J, Elkins J, Altschul D. Historical Trauma Among Indigenous Peoples of the Americas: Concepts, Research, and Clinical Considerations. *J Psychoactive Drugs*. 2011;43(4):282-290.

and abuse, specifically in research with Native Americans and Mexican Americans, thought to be as a coping mechanism for present-day stressors.^{38, 41, 42} Teddy Nez, a resident of the Red Water Pond Road Community who was temporarily displaced in 2007 stated,

We kept telling them that relocation is a horrible word, simply because of what we have gone through with the Navajo Hopi relocation program. It's still hurting a lot of people right now. We tell them we don't want to use that relocation word. Since then they started using 'temporary housing'.⁴³

The disastrous effects of uranium mining and milling are one of the past traumas experienced by the Navajo people. As stated by Markstrom,

"When victims of disasters are already marginalized due to poverty and racism, the impacts are compounded. Certainly, insult to the personal integrity of American Indians occurred through forced acculturation, racism, and dissemination. These and other experiences of persons for colonized groups are part of the ongoing process of historical trauma and result in spiritual injury called the soul wound."²⁴

The quote from Red Water Pond Road community resident Teddy Nez, alludes to the fact that many Navajo people had been traumatized in response to the 1974 Navajo-Hopi Relocation and earlier federally imposed relocations. Adding to the trauma of relocation for Navajo people selected to temporarily move, is the uncertainty and fear surrounding potential uranium exposures for those Navajo people who have not been selected for temporary moves. Worries include breathing in radiation contaminated wind-blown dust, consuming livestock meat that may have fed on contaminated grassland, and drinking the only water sources available that may be contaminated. Not only are residents concerned for their own well-being, but for the well-being of their families, and future Diné generations. Many community members from Red Water Pond Road have requested to be relocated to the Black Tree Mesa, which is about 3 miles from where the currently live. Their families previously had summer camps on top of the Mesa and this is a desired location for some families during the clean-up process.

In addition to exorbitant costs and an extremely long timeframe associated with cleanup, the human health and psychological impacts are associated with temporarily being displaced from your home and land as well as the environmental devastation caused by uranium production as evidenced by visual impacts of the cleanup process.

D. Impacts of Additional Health Studies on Existing Health Conditions (related to Displacement and Relocation)

Even with additional health studies on uranium mining in the area, relocation will still likely be required as part of the required AUM cleanup efforts that are currently ongoing. However, conducting future studies would reduce the need for *future* relocation, and thus avoid associated adverse impacts to health.

⁴¹ *Fact Sheet: Historical Trauma*. Substance Use and Mental Health Services Administration (SAHMSA): Gains Center for Behavioral Health and Justice Transformation; :1-3.

⁴² Morgan R, Freeman L. The Healing of Our People: Substance Abuse and Historical Trauma. *Subst Use Misuse*. 2009;44(1):84-98.

⁴³ Helms, K. (2009). *Red Water Pond Road Residents Prepare for 5-month Relocation*. Gallup Independent. August 27th.

E. Specific Recommendations for Displacement and Relocation

- Require further health studies to be conducted on uranium mining with adequate funding support.

VII. Cultural Relevance of the Land and Community Efficacy

A. Background on Cultural Relevance of the Land and Community Efficacy

The Navajo reservation covers 27,000 square miles in the states of Arizona, New Mexico, and Utah and is the largest reservation in the United States. The Navajo culture is agrarian, with many Navajo people raising sheep and other livestock, which are used for wool and food. Roads on the reservation are unpaved, small population centers are widely dispersed, and many homes do not have electricity or piped water. Residents living in homes without piped water haul their water from unregulated and untreated water sources such as livestock wells or natural springs.⁵ The Navajo people's cultural connection to the land is such that they view the earth according to the four related elements of atmosphere, land, water, and sunlight or fire. The earth is the female counterpart of the male sky. ***The goal of Navajo people is to achieve balance and harmony between humans and nature and they view uranium mining as disrupting the balance of earth and sky.***²⁴ The significance of Hozho was mentioned earlier in this report.

B. Existing Data for Impacts of Uranium Mining on Cultural Relevance of the Land and Community Efficacy

Because of legitimate concerns about the federal government's secrecy regarding the health effects from uranium production and other historical atrocities committed by the federal government against the Navajo people, the U.S. EPA and other Federal agencies have much to overcome in order to regain trust with the Navajo people. The level of distrust of the government amongst Navajo residents is evident in this statement by Helen Johnson, in an excerpt from Markstrom's article, "The real sad thing about it was that they were never straight about what the hell this radiation was or would do to the health of these innocent people. White men are not honest people. In the Treaty of 1868 it mentioned that the federal government would protect the health of Navajo people. Yet they didn't do so." ²⁴

In a review of activities undertaken by the multi-agency effort in response to the 2007 hearing before the Committee on Oversight and Government Reform, the 2014 GAO report points to several challenges related to trust building and community engagement. These include: 1) building trust may require significant time and effort on the Navajo Nation and working with community members, 2) the number of outreach staff is small compared with the size of the reservation (1.5 U.S. EPA full-time equivalent (FTE), 1 Navajo Nation FTE, 2 IHS FTEs), 3) commonly used tools for engaging communities may not be effective in Navajo communities, and 4) federal agencies have not coordinated their outreach efforts. ***Many of the challenges of trust building and community engagement come from a lack of trust originating from a long history of dishonesty of the U.S. government and a lack of effort to overcome this history—a lack of community efficacy—and from feelings of injustice,*** exemplified by the small number of staff members dedicated to outreach and the absence of an U.S. EPA field office on the Navajo Nation; the cultural importance of oral communication for information exchange; and inter-governmental turf issues, particularly among U.S. EPA and DOE, as indicated in the GAO report. In response to

an email request for information regarding culturally appropriate outreach and information exchange, Sara Jacobs, U.S. EPA site manager for the NECR mine, sent responses to specific questions posed by the McKinley Community PLACE MATTERS Team (see **Appendix 7**). They highlight a number of efforts on the part of U.S. EPA to engage with the Navajo community in a more culturally sensitive manner as they move through their highly bureaucratic and structured process of community engagement related to cleanup. Jacobs is also working closely with McKinley Community PLACE MATTERS and Red Water Pond Road Community Association to provide adequate housing options for people during the clean up process.

C. Cultural Relevance of the Land and Community Efficacy and Impacts on Health

Community efficacy is a concept, which modifies and applies Albert Bandura's famous idea of individual agency at the community level.⁴⁴ Bandura is well known for putting forth the importance of people believing in their capacity to take action for prospective situations. It is similar to the concept of collective efficacy, which may be defined as the people's shared belief in their collective power to produce specific changes. Collective efficacy is based upon the social capital of a community and a shared expectation for action towards social change.⁴⁵ ***Community efficacy is built through participation in common activities, shared understandings and values, successful experience of working together where perseverance has been exercised, partnerships between government and non-government organizations, and long-term aims that overlap the goals of diverse groups. Community efficacy reflects the level of social trust in civic institutions.***⁴⁶ Since communities are not socially homogenous, and some groups have more social and economic power than others, the nature and quality of opportunities are unequal.⁴⁷ Groups that are excluded from aspects of community social capital are likely to also be excluded from related social and economic well-being.⁴⁸

An emerging body of research has begun to explore how social processes and conditions, such as mutual trust, shared expectations, reciprocal exchange of information, social control, and participation in voluntary associations, influence public health outcomes.⁴⁹ There is growing evidence that links a community's sense of social cohesion and connectedness with improved mental and physical health outcomes, as well as the general "well-being" of its community members.⁴⁸ The quality of local leadership and patterns of governance have a large impact on a community's capacity to take up social and economic opportunities and to manage change.^{49,50} Many policy-makers are looking to research "what works" in terms of social policy interventions, how to intervene in communities effectively, and how to work with communities through community participation and community capacity building.⁵¹

The Diné Policy Institute in their Uranium and Diné Benitseekees Position Paper 1, provides an explanation of the Navajo Traditional Philosophical paradigm of *Sa'ah Naghai Bik'e Hozhoon* which

⁴⁴ Kilpatrick S, Abbott-Chapman (2005). *Community Efficacy and Social Capital*. Proceedings from 2nd National Conference on the Future of Australia's County Towns, July 11-13, La Trobe University, Bendigo, Victoria.

⁴⁵ Sampson R (2003). The Neighborhood Context of Well Being. *Perspectives in Biology and Medicine* 46(3):S53-S64, Johns Hopkins University Press.

⁴⁶ Misztal B (1996). *Trust in Modern Societies*, Oxford, Polity Press.

⁴⁷ Walter C (1997). Community Building Practice: A Conceptual Framework. *Community Organizing and Community Building for Health*. M.Mindler (ed) New Brunswick NJ, Rutgers University Press.

⁴⁸ Eckersley R (1998). *Measuring Progress: Is Life Getting Better?* Collingwood, Victoria CSIRO Publishing.

⁴⁹ Gittel R, Vidal A (1998). *Community Organizing: Building Social Capital as a Development Strategy*. London Sage Publications.

⁵⁰ Falk I, Kilpatrick S (2000). What is Social Capital? A Study of Interaction in a Rural Community. *Sociologia Ruralis* 40(1): 870-910.

⁵¹ Reddell T (2002). Beyond Participation, Hierarchies, Management and Markers: New Governance and Place Policies. *Australian Journal of Public Administration* 61(1):50-63.

is the philosophy of living “that tends toward walking a balanced life, with longevity and resilience” in sustained harmony (K’e’). A portion of K’e’ is “the rights and freedoms of the people to use the sacred elements of life... must be accomplished through... respect ... to protect and preserve beauty of the natural world for future generations.” The paper also discusses the fact that although compensation via RECA exists it does not “bring a sense of harmony back” to the people. Balance is essential within the concept of *Sa’ah Naghai Bik’e Hozhoon*. “The act of the federal government may fall in line with some conceptions of justice, however it fails to comport with the Navajo understanding of reciprocity delineated by k’e’. ***Because uranium was extracted from the land and home of the Navajo Nation, uranium mining in general has disrupted K’e’ and balance.***⁵²

That the uranium was extracted and used in the atomic bombs in WWII is of great significance to the Navajo population who may be aware or unaware of the various dynamics of uranium mining in Navajo country. At a meeting held in November 2013 initiated by Council Delegates, Navajo Nation Administration and community members, one thought included that the amount of destruction caused by the bombs in Japan, have in turn been experienced by the Navajo. The numbers lost are similar and comparable between those lost due to the dropping of the bombs, and those lost due to the mining of the raw materials of uranium.

The Markstrom article shares, “There is great respect for thought and speech processes, responsibility and accountability are implicit in communication.” According to Markstrom, “the most relevant Navajo taboo, in the context of the uranium disaster is to not speak about the death of someone who has died. To do so may call up their ghost and bring harm to the speaker.” Thus, in Navajo tradition, you do not talk about death or the passing of your loved ones. Navajo explanations for the causes of illness frequently do not follow western thought, and instead follow a holistic view of healing through the four domains of spiritual, psychological, emotional and physical existence.²⁴ Further, it is important to understand the cultural relevance of environmental restoration among the Navajo people. ***Because the Navajo people share a high regard for the sacred nature of the environment and link their psychological well being to environmental stability, the role of environmental cleanup in psychological healing should not be taken lightly.***^{ibid}

Health Impact Assessments have been found to strengthen connections between the community and related authorities—increasing community efficacy.⁵³ In particular, participation in the process of creating policy has the potential to change the power dynamic between communities and those traditionally regarded as decision-makers. In this way, research has shown that participation may help decrease levels of exclusion and increase efficacy among frequently marginalized groups.⁵⁴ This HIA process specifically asked questions regarding the levels of participation in decision making processes, how much they trusted people or agencies making decisions about mining in the area, and their sense of power to inform a decision making process.

⁵² Uranium and Dine Benitseekees Position Paper 1. Retrieved from: http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CB8QFjAA&url=http%3A%2F%2Fwww.dinecollege.edu%2FInstitutes%2FDPI%2FDocs%2FUraniu_m_policy_brief.doc&ei=2I8HVcyFGZLWoASNn4LQDw&usg=AFQjCNH78CDWm2lsdvCbzxsgH5tGjrj_9g&sig2=ZhLWDR1lmZSLmEOLbPrj5A&bvm=bv.88528373,d.cGU

⁵³ Elliot E, Williams G (2008). Developing public social sociology through health impact assessment. *Social Health Illn* 30(7): 1101-1116.

⁵⁴ Parry J, Wright J (2003). Community participation in health impact assessments: intuitively appealing but practically difficult. *Bull World Health Organization* 81(6):388.

D. Predicted Impacts of Additional Health Studies on Existing Health Conditions (related to cultural relevance and community efficacy)

In many ways, past impacts of uranium mining on culture and community have occurred from years of violation of trust of the Navajo people (which includes residents of McKinley County). However, additional health studies on uranium mining in McKinley County would be a first step towards achieving balance and building trust. This action would be an acknowledgement of sorts to the people that have been impacted by the devastating consequences of uranium mining, and would enable the healing to begin through thoughtful, conscientious clean up efforts to existing impacts.

By engaging the McKinley County residents in the process of policy making by conducting future health studies on uranium mining, community efficacy increases. Uranium mining has devastated local community health in many ways, so this action would further build trust between government and residents, and act as an acknowledgement of their needs and wishes. In addition, by engaging in studies to assess the public health, economic and environmental impacts of uranium mining on McKinley County and its residents, community efficacy would also improve in that residents would begin to be engaged in/feel part of the overall process of decision-making about their land.

IX. Summary of Findings and Recommendations

This Health Impact Assessment analyzes the effects of conducting additional health studies on uranium mining for McKinley County on three health determinants: (1) environmental contamination and pollution; (2) displacement and relocation; and (3) cultural relevance of the land and community efficacy. Future research studies would allow for additional time to analyze the potential health effects of the existing facilities as well as require extensive cleanup of existing contaminated areas and homes within McKinley County prior to permitting future mining of the area.

Existing Health Conditions in McKinley County and Navajo Nation

- In 2010, McKinley County documented 42.8% of children under the age of 18 living in poverty.
- In 2013 in the Navajo Nation area of McKinley County, almost 39% of individuals were living in poverty.
- There are minimal culturally sensitive resources in the area to assist residents with policy and practices that have perpetuated discrimination, which creates a foundation of social norms that keep people divided and unable to join forces for systematic change to benefit the entire community.
- McKinley County residents have higher rates of stomach, kidney, renal and pelvis cancer than the populations of both New Mexico and the U.S.

Environmental Contamination and Pollution

There is a long history of the effects of uranium mining on the people of the Navajo Nation, including the area that is McKinley County. ***In response to widespread uranium contamination on the Navajo reservation, the Navajo Nation passed two laws: one law in 2005 which began banning uranium production on any site within the tribe's territorial jurisdiction and one law in 2012 banning the transportation of uranium ore or radioactive waste through lands under the tribe's territorial jurisdiction.*** Despite this, high levels of environmental contamination and pollution persist in McKinley County due to a long legacy of mining and lack of cleanup of mine

and mill sites. This contamination and pollution due to occupational and non-occupation exposures causes health effects.

- The U.S. EPA estimates that the future costs for cleanup of priority mine sites to be in the hundreds of millions of dollars, thus given current funding levels; **it would take U.S. EPA 105 years to fund the removal actions at just 21 of the highest priority mines.**
- **There are 155 acres, or an estimated 870,000 cubic yards, of uranium waste material above safe levels near the North East Church Rock mine (the study area for this HIA) with some areas having more than 25 times what is considered safe.**
- **Evidence exists suggesting potential for increased kidney disease/failure as a result of uranium exposure increases the individual's risk for cardiovascular (heart) disease and hypertension (high blood pressure).**
- **Preliminary findings indicate active mining-era exposures (i.e. people worked in a mine, mill site, or reclamation site, lived in a mining camp, and/or washed clothes of a mine worker) predicted an increased risk of kidney disease.**
- **Environmental legacy exposures such as living near a mine, herding livestock close to a mine site, playing near a mine site, and/or drinking or coming into contact with mining water predicted increased risk of hypertension and autoimmune disease.**
- **Preliminary results show that close proximity to a mine or mill site increases risk of immune system dysfunction.**
- **Research has found the death rates of Navajo uranium miners was 3.3 times greater than for the U.S average for lung cancer.**
- **Self-reported health issues of residents who went through the medical screenings and who lived near AUMs, included (number in parentheses are number of respondents reporting the illness): diabetes (201), headaches (224), high blood pressure (253), eye problems (289), arthritis (183), depression (157), respiratory problems (131), heart conditions (86), anxiety (117), skin rashes (102), miscarriages (68), cancer (57), developmental issues (32), learning issues (72), kidney problems (77), and speech delay (63).**
- **Psychological impacts of disasters can be organized around the following major themes: 1) human losses and bereavement; 2) environmental losses and contamination; 3) feelings of betrayal by government; 4) fears about current and future effects of contamination and radiation exposure; 5) prolonged duration of psychological effects; 6) anxiety and depression; and 7) the complicating factors of poverty and racism.**

Impact Prediction

Should additional health studies on uranium mining be enacted in McKinley County, it would allow for the cleanup of existing AUM to be prioritized and would generate a larger body of evidence to understand the effects of uranium mining on the health of residents living adjacent to these AUM **prior to the onset of new mining and exploration. As a result, it would allow the community time to recover from the existing environmental contamination and pollution from the abandoned AUMs in the area.**

Displacement and Relocation

Displacement and relocation has a long and difficult history for the Navajo community. Despite this, in order to begin to clean up the long legacy of contamination due to uranium mining, displacement and relocation is a necessary evil for the removal of existing contamination in the area.

- ***The expected date for removal/cleanup action completion for the North East Church Rock mine is 2018 or later, 4 or more years beyond what was originally projected.*** In addition, U.S. EPA officials have acknowledged that this schedule is optimistic.
- To date, over 70 residents have been temporarily displaced due to cleanup efforts.
- Although the former operator and potentially responsible party at the North East Church Rock mine is taking the lead for the cleanup, ***the government will pay up to 33% of future cleanup costs, which U.S. EPA estimated a total future costs could be \$44 million, while cleanup of priority mining sites is expected to be in the hundreds of millions of dollars.***
- ***This combination of long delays and overall long time periods for removal and remediation would, thus, require people to be displaced, in some cases permanently, and in other cases continuously and for longer periods during the cleanup process.***
- The U.S. EPA estimates that the future costs for cleanup of priority mine sites to be in the hundreds of millions of dollars, thus given current funding levels ***it would take U.S. EPA 105 years to fund the removal actions at just 21 of the highest priority mines.***

Impact Predictions

Even with conducting future studies on uranium mining in the area, there are likely to be health impacts from relocation due to the continued need to clean up the existing mining impacts from the AUM in the area. However, *future* impacts of displacement and relocation and their health effects could be avoided.

Cultural Relevance of the Land and Community Efficacy

Navajo people's cultural connection to the land is such that they view the earth according to the four related elements of atmosphere, land, water, and sunlight or fire. The earth is the female counterpart of the male sky. ***The goal of Navajo people is to achieve balance and harmony between humans and nature and they view uranium mining as disrupting the balance of earth and sky. Community efficacy is built through participation in common activities, shared understandings and values, successful experience of working together where perseverance has been exercised, partnerships between government and non-government organizations, and long-term aims that overlap the goals of diverse groups. Community efficacy reflects the level of social trust in civic institutions.***

- ***Many of the challenges of trust building and community engagement come from a lack of trust originating from a long history of dishonesty with the U.S. government and a lack of effort to overcome this history—a lack of community efficacy—and from feelings of injustice,*** exemplified by the small number of staff members dedicated to outreach and the absence of an U.S. EPA field office on the Navajo reservation
- ***Because the Navajo people share a high regard for the sacred nature of the environment and link their psychological well being to environmental stability, the role of environmental cleanup in psychological healing should not be taken lightly.***

Impact Predictions

In many ways, past impacts to cultural relevance and health have occurred from years of uranium mining and poor trust building and outreach to the Navajo people as uranium mining in general has disrupted *K'e'* and balance. However, conducting additional health studies, it demonstrates a first step towards achieving balance and building trust would be taken. Conducting additional health studies would be an acknowledgement of sorts to the people that uranium mining has devastating health effects on their cultural relevance to the land and would enable the healing to begin through thoughtful, conscientious clean up efforts to existing impacts.

By engaging the McKinley County residents in the process of policy making on uranium mining, community efficacy increases. Clearly local residents feel that uranium mining has devastated their community and their health, so this action would further build trust between government and residents as an acknowledgement of their needs and wishes. In addition, by engaging in studies to assess the public health, economic and environmental impacts of uranium mining on McKinley County and its residents, community efficacy increases.

Recommendations:

1. Require further health studies to be conducted on uranium mining with adequate funding support.

X. APPENDICES

Appendix 1: Historical Timeline of Uranium Mining and Production on Navajo Lands^{4, 23, 55}

| | |
|-----------|--|
| 1930 | Link between uranium, and its by-products, and lung cancer found in Europe. |
| 1948-1971 | Federal government spurs mining of uranium ore on the Navajo reservation in response to World War II and provides guaranteed purchase and price to private milling/mining companies. |
| 1950 | U.S. Public Health Service (PHS) findings on the health impacts of uranium mining based on a study population of uranium miners working on the Colorado Plateau. Although there was knowledge of the link between uranium mining and lung cancer, study participants were not informed of these risks. |
| 1951 | Unsuccessful advocacy by Navajo miners for ventilation in uranium mines. |
| 1951 | The U.S. Atomic Energy Commission (now the Department of Energy, or DOE) and the PHS learn that radon levels in uranium mines exceed levels that cause cancer. |
| 1960 | New Mexico becomes the sole state to pass state legislation requiring mine closure if mines exceed the 10 working level limit for radon. |
| 1960's | After 10 years of mining, the first cases of lung cancer appear in Navajo miners. |
| 1960's | Decline in uranium ore purchases and prices. |
| 1966 | Navajo advocates testify in Congressional hearings for the regulation of uranium mines and worker protections. |
| 1968 | NECR mine, operated by UNC opens in Church Rock, New Mexico. |
| 1969 | Standard for radon of 0.3 working level limit is implemented. |
| 1973 | Navajo advocates testify in Congressional hearings to extend <i>black lung</i> benefits to families of uranium miners after miners working in West Virginia coal mines were successful in receiving <i>black lung</i> benefits. |
| 1974 | Navajo Hopi Relocation Act passed by the U.S. Congress in response Peabody Coal's intent to mine coal on the Navajo reservation. |
| 1978 | Navajo advocate, Tome, works with Interior Secretary Udall to require compensation from mining/milling companies and the federal government to families that were victims of uranium mining. |
| 1979 | The largest radioactive accident in the U.S., the "Church Rock Tailings Spill," occurs when United Nuclear Corporation's mill tailings disposal pond breaches its dam. Over 1,000 tons of solid radioactive mill waste and 3 million gallons of radioactive tailings solution flow to the Puerco River and travels 80 miles downstream to Navajo County, Arizona. Although this was the largest radioactive accident in U.S. history, the event was extremely underreported in the media, particularly when considering the media attention given to the Three Mile Island accident occurring within the same timeframe. |
| 1979-1982 | U.S. Congressional hearings on compensation for uranium miners/millers. |
| 1980 | Passage of Superfund law giving the U.S. EPA the power to identify the worst toxic waste sites in the U.S. and to force polluters to pay for cleanup, health studies, clinics, maintenance, and monitoring. If no responsible parties were found, the U.S. EPA could pay for the cleanup from a \$6 billion trust. |

⁵⁵ Pasternak, J (2006). *Blighted Homeland* Los Angeles Times: November 21, 2006.

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| 1980 | Court finds mining/milling companies not responsible in lawsuit filed by Udall on behalf of uranium miners seeking damages from mining/milling companies. |
| 1987 | Court finds the federal government immune in response to a lawsuit filed by Udall on behalf of uranium miners seeking damages from the U.S. government. |
| 1970-1980 | Increase in commercial purchases of uranium ore for nuclear power plants (at or above previous U.S. government purchasing levels). |
| 1982 | Closure of NECR mine. |
| 1982 | Navajo Tribal Government demands \$6.7 million from a federal claims court to seal and cleanup 300 mines because federal inspectors had failed to enforce safety standards in order to keep down the price of bomb material. |
| 1984 | Health assessments of Navajo uranium miners and health outcomes. |
| 1985 | Judge rejects Navajo Tribal Government's claim that federal inspectors had failed to enforce safety standards in order to keep down the price of bomb material, calling it, "entirely speculative." |
| 1990 | Staff members of the Navajo Environmental Commission measure radiation at mines throughout the Navajo reservation for listing on Superfund's National Priorities List. The U.S. Centers for Disease Control and Prevention (CDC) declares a health emergency in response to extremely high radiation levels measured at New Mexico's Haystack Butte. |
| 1990 | Passage of Radiation Exposure Compensation Act (RECA). |
| 1993 | Hoskie, Navajo environmental administrator, testifies before two House Subcommittees that the Navajos want speedy, thorough, and permanent remediation of all mine sites on the Navajo reservation. |
| 1994 | Tribal and federal officials gather in Albuquerque to devise a plan to cleanup the mines, but talks break down. |
| 1990's | Malone, the Navajo's liaison to the Superfund program, by chance visits NECR mine's waste piles. |
| 1998 | U.S. EPA begins testing for radiation and water contamination throughout the reservation, but after an argument between Tribal and federal officials over control of information, sampling efforts cease. |
| 2000 | EEOICPA payments of \$400,000 maximum to compensate employees having illnesses attributed to: 1) production of weapons materials, and 2) uranium mill cleanup employees. |
| 2003 | Malone and Navajos measure radiation at residences near the NECR mine. |
| 2005 | Navajo Nation enacts a law prohibiting uranium mining and processing on any site within the tribe's territorial jurisdiction. |
| 2007 | Hearing before House Committee on Oversight and Government Reform leads to a multi-agency effort to assess and cleanup hundreds of structures on the reservation through a five-year plan (2007-2012). |
| 2007 | Navajo Nation sets a goal to have all uranium-contaminated soils removed from the Navajo reservation. |
| 2007 | U.S. EPA initiates emergency cleanup to remove 6,500 cubic yards of radium-contaminated soils around 4 residences located between the NECR mine and the Quivera mines. |
| Early 2009 | General Electric, parent company of UNC, shows 1 st quarter earnings of \$2.8 billion from continuing operations. |
| 2009 | Removal of 97,000 cubic yards of radium contaminated soils around 3 |

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| | households on Red Water Pond Rd. and an unnamed arroyo. |
| Sept 2009 | U.S. EPA presents removal action plan for NECR mine. |
| 2012 | Navajo Nation enacts a law prohibiting the transportation of uranium ore or radioactive waste through lands under the tribe's territorial jurisdiction. |
| 2013 | Navajo Nation Council approves Resolution acknowledging a private company's right-of-way across tribal land near Church Rock, NM and authorizing its use for a demonstration project that extracts uranium from beneath the surface. |
| 2013 | Navajo Nation Department of Justice concludes the Resolution is in conflict with the 2005 and 2012 laws. |
| 2013 | U.S. EPA publishes "Federal Actions to Address Impacts of Uranium Contamination in the Navajo Nation – Five Year Plan Summary Report". |
| 2014 | U.S. EPA publishes "Federal Actions to Address Impacts of Uranium Contamination in the Navajo Nation". A report outlining future steps for cleanup. |
| 2014 | The Government Accounting Office publishes "Uranium Contamination: Overall Scope, Time Frame, Cost Information is Needed for Contamination Cleanup on the Navajo Reservation". |

RESOLUTION OF THE
NAVAJO NATION COUNCIL

20th NAVAJO NATION COUNCIL - Third Year, 2005

AN ACT

RELATING TO RESOURCES, AND DINÉ FUNDAMENTAL LAW; ENACTING
THE DINÉ NATURAL RESOURCES PROTECTION ACT OF 2005; AMENDING
TITLE 18 OF THE NAVAJO NATION CODE

BE IT ENACTED:

Section 1. Enactment of the Diné Natural Resources
Protection Act of 2005

The Navajo Nation Council hereby enacts the Diné
Natural Resources Protection Act of 2005.

Section 2. Purpose

The purpose of the Diné Natural Resources Protection
Act of 2005 is to ensure that no further damage to the
culture, society, and economy of the Navajo Nation occurs
because of uranium mining within the Navajo Nation and the
Navajo Indian Country and that no further damage to the
culture, society and economy of the Navajo Nation occurs
because of uranium processing until all adverse economic,
environmental and human health effects from past uranium
mining and processing have been eliminated or substantially
reduced to the satisfaction of the Navajo Nation Council.

Section 3. Amendments to Title 18 Navajo Nation Code

The Navajo Nation Council hereby amends the Navajo
Nation Code, Title 18, as follows:

§1301. Findings

A. The Navajo Nation Council finds that the wise and
sustainable use of the natural resources in Navajo Indian
Country traditionally has been, and remains, a matter of
paramount governmental interest of the Navajo Nation and a
fundamental exercise of Navajo tribal sovereignty.

B. The Navajo Nation Council finds that the Fundamental Laws of the Diné (Diné Bi Beenahaz'annii), as set forth in the 2002 amendments to Title 1 of the Navajo Nation Code, Resolution No. CN-69-02, support preserving and protecting the Navajo Nation's natural resources, especially the four sacred elements of life - air, light/fire, water and earth/pollen - for these resources are the foundation of the peoples' spiritual ceremonies and the Diné life way, and that it is the duty and responsibility of the Diné to protect and preserve the natural world for future generations.

C. The Navajo Nation Council finds that the Traditional (Diyin Dinée Bi Beehaz'aani Bitse silei), which are codified in Title 1 as sections 3 and 4 of the Fundamental Laws of the Diné, provide that it is the right and freedom of the people to be respected, honored and protected with a healthy physical and mental environment.

D. The Navajo Nation Council finds that the Diné medicine peoples' interpretation of the Diné Natural Law (Nahaszaan doo Yadiilhi Bitsaadee Beehazaanii), which is codified in Title 1 as 5 of the Fundamental Laws of the Diné, mandates respect for all natural resources within the four sacred mountains and is symbolized by the Sacred Mountain Soil Prayer Bundle (Dahndiilyee), to maintain harmony and balance in life and a healthy environment, and their recitation of the ceremonies and stories that have been passed down from generation to generation warn that certain substances in the Earth (doo nal yee dah) that are harmful to the people should not be disturbed, and that the people now know that uranium is one such substance, and therefore, that its extraction should be avoided as traditional practice and prohibited by Navajo law.

E. The Navajo Nation Council finds that the social, cultural, natural resource, and economic damage to the Navajo Nation from past uranium mining and processing is ongoing due to (i) the continuing need for full monetary compensation of former Navajo uranium workers and their family members for their radiation and mining-induced diseases, (ii) the presence of hundreds of unremediated or partially remediated uranium mines, tailings piles, and waste piles located in Navajo Indian Country, and (iii) the

absence of medical studies of the health status of Diné who live in uranium mining-impacted communities.

F. The Navajo Nation Council finds that the mining and processing of uranium ore on the Navajo Nation and in Navajo Indian Country since the mid-1940s has created substantial and irreparable economic detriments to the Nation and its people in the form of lands lost to permanent disposal of mining and processing wastes, lands left unproductive and unusable because they are the sites of hundreds of abandoned uranium mines that have not been successfully reclaimed, surface water and ground water left unpotable by mining and processing operations, livestock that could not be marketed because they were believe to have been contaminated by uranium. Navajo workers who lost thousands of person-years to gainful economic activity as a result of their mining-induced illnesses and deaths, and the families of Navajo uranium workers whose livelihoods, agricultural lands and homesites were diminished in value because of the illnesses and premature deaths of the workers.

G. The Navajo Nation Council finds that there is a reasonable expectation that future mining and processing of uranium will generate further economic detriments to the Navajo Nation. These economic detriments include, but are not limited to, the potential damage projected to the land, water, vegetation, and other natural resources of the Navajo Nation by uranium mining and processing operations, the forbearance or foreclosure of the Navajo Nation from using these natural resources for other economic purposes, the potential remediation costs for damage projected to the natural resources on lands within the Navajo Nation, the potential injury to livestock from uranium mining, including, but not limited to, losses in livestock production, veterinary and other costs, and the potential injury to human beings from uranium mining, including, but not limited to, loss of wages, loss of consortium, medical costs, loss of access to and use of vegetation used in traditional ceremonies, loss of current and future potable water supplies, and other costs.

H. The Navajo Nation Council finds that uranium is and has been expressly left unregulated by the federal government, and is currently unregulated by any tribal entity within Navajo Indian Country.

§1302. Definitions.

For purposes of this Act, the Navajo Nation Council adopts the following definitions:

A. Navajo Indian Country shall mean all lands within the territorial jurisdiction of the Navajo Nation as defined in 7 N.N.C. §254 and 18 U.S.C. §1151.

B. Natural resources shall have the same meaning as set forth in 2 N.N.C. §692(A).

C. Person shall mean any natural person or any other entity including domestic or foreign corporations, partnership, associations, responsible business or association agents or officers, any of the several States or a political subdivision of the state or agency of the state, department or instrumentality of the United States and any of its officers, agents or employees.

D. Remediation shall mean the permanent closure of uranium mining and processing site, waste piles and associated buildings for the purposes of eliminating or substantially reducing releases of radioactive and toxic substances to the air, land and water in such ways as to prevent or substantially minimize human exposure to such substances now and for future generations.

E. United States shall mean the federal government of the United States of America and any of its agencies, departments, subdivisions, or instrumentalities or officers, agents, or employees thereof.

F. Uranium mining shall mean the extraction of uranium or uranium ores by mechanical means including, but not limited to, surface mining, open pit mining or underground mining. Uranium mining shall not include extraction of uranium or uranium ores by solution mining.

G. Uranium processing shall mean the alteration or uranium ores from their natural state by mechanical or chemical including, but not limited to, crushing, grinding, and in situ leach mining or solution mining.

§1303. Prohibition of Uranium Mining

No person shall engage in uranium mining and uranium processing on any sites within Navajo Indian Country.

Section 4. Codification

The provisions of this Act which adopt new sections of the Navajo Nation Code shall be codified by the Office of Legislative Counsel. The Office of Legislative Counsel shall include these sections in the next recodification or supplement of the Navajo Nation Code, to the extent practicable.

Section 5. Savings Clause

Should any provisions of this Act be determined invalid by the Navajo Nation Supreme Court, or the District Court of the Navajo Nation, without appeal to the Navajo Nation Supreme Court, or any other court of competent jurisdiction, those portions of this Act which are not determined invalid shall remain the law of the Navajo Nation.

CERTIFICATION

I hereby certify that the foregoing resolution was duly considered by the Navajo Nation Council at a duly called meeting in Window Rock, Navajo Nation (Arizona) at which a quorum was present and that the same was passed by a vote of 63 in favor and 19 opposed, this 19th day of April 2005.


Lawrence T. Morgan, Speaker
Navajo Nation Council

21 Apr '05
Date

Motion: Mark Maryboy
Second: Harry Hubbard

RESOLUTION OF THE
NAVAJO NATION COUNCIL

22ND NAVAJO NATION COUNCIL - SECOND YEAR 2012

AN ACT

RELATING TO THE LAW AND ORDER; RESOURCE AND DEVELOPMENT; AND NÁABIK'ÍYÁTI' COMMITTEE; THE RADIOACTIVE AND RELATED SUBSTANCES, EQUIPMENT, VEHICLES, PERSONS AND MATERIALS TRANSPORTATION ACT OF 2012: AMENDING THE NAVAJO NATION CODE TITLE 18, CHAPTER 12, TO PROVIDE FOR THE PROTECTION, HEALTH AND SAFETY OF THE NAVAJO NATION PEOPLE WITH REGARD TO THE TRANSPORTATION OF RADIOACTIVE AND RELATED SUBSTANCES, EQUIPMENT, VEHICLES, PERSONS AND MATERIALS OVER AND ACROSS NAVAJO NATION LAND.

BE IT ENACTED:

1. Findings and Purpose.

A. The Navajo Nation finds it to be in the Best interest of the Navajo Nation, its citizens, guests and visitors to adopt "The Radioactive and Related Substances, Equipment, vehicles, Persons and Materials Transportation Act of 2012" and hereby adopts said Act amending Title 18, Chapter 12 as follows:

Chapter 12-A.

The Radioactive and Related Substances Equipment,
Vehicles, Persons and Materials Transportation Act of
2012

§ 1304. Background, Findings, and Rationale

A. The Navajo Nation opposes generally the transportation of radioactive and related substances, equipment, vehicles, persons and materials over and across Navajo Nation lands, except for purposes of transporting uranium ore or product currently left within the Navajo Nation from past uranium

mining or milling operations for disposal at an appropriate long-term facility outside of Navajo Indian country or at an appropriate temporary facility within Navajo Indian country and approved by the Navajo Nation Environmental Protection Agency.

- B. The Navajo Nation has the right to exclude nonmembers and to condition their entry onto Navajo Nation lands, and has the independent sovereign right and duty to protect the health, welfare and safety of the Navajo Nation and its citizens.
- C. As a matter of federal law, Congress has plenary authority to regulate commerce with the Navajo Nation. Article III of the treaty between the United States of America and the Navajo Nation ratified on September 9, 1850 provides that the United States shall have the sole and exclusive right of regulating trade and intercourse with the Navajo Nation, and, in exchange, Article XI of the Treaty provides that the United States "shall so legislate and act as to secure the permanent prosperity and happiness of" the Navajo People." Under that treaty and the second such treaty made and ratified in 1868, see 15 Stat. 667, "Congress has...left the [Navajos] largely free to run the reservation and its affairs without state control," *Warren Trading Post Co. v. Arizona State Tax Comm'n*, 380 U.S. 685, 690 (1965), and the Navajo Nation has accepted the responsibility of governing its territory, see *Kerr-McGee Corp. v. Navajo Tribe of Indians*, 471 U.S. 195, 200-201 (1985); *Williams v. Lee*, 358 U.S. 217, 223 (1959).
- D. Under its constitutional authority, Congress defined "Indian Country" broadly in 1948, and applied that term to demarcate generally civil and criminal authority of states on the one hand and of the United States and Indian governments on the other, and rejected jurisdictional determinations based on refinements of easement law by including all rights-of-way running through Indian reservations as "Indian country." See Richard B. Collins, *Implied Limitations on the Territorial Jurisdiction of Indian Tribes*, 54 Wash. L. Rev. 479, 527 & n.286 (1979)
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- E. The road system within Navajo Indian country includes Bureau of Indian Affairs roads, Navajo tribal roads, and State and county roads, all such roads and related rights - of-way being Navajo "Indian country as defined by Congress for purposes of Navajo Nation civil and criminal jurisdiction.
- F. The Navajo People and the Navajo Nation government have been substantially harmed by the exploration for and mining, production, processing, milling and transportation of uranium ore, yellowcake and other radioactive products other than those used for medical purposes and shall hereinafter singly or in any combination be referred to as the "Products" on, near and through Navajo Indian country; such exploration, mining, production, processing milling and transportation of the Products to be referred hereinafter as the "Activities". Over 500 uranium mines were left abandoned in Navajo Indian country, four very large piles of uranium mill tailings are located on or adjacent to Navajo Nation lands in unlined areas leaching contaminants into surface and ground water supplies. Navajo people bore the brunt of the largest accidental release of radioactivity in the United States; see *UNC Resources, Inc. v. Beñally*, 514F. Supp. 358 (D.C. N.M. 1981); Navajo uranium miners in the Cold War era continue to suffer debilitating and lethal impacts from their service; planned uranium mining threatens scarce Navajo drinking water resources; and hazardous and other wastes contaminate the Navajo environment with no responsible person, corporation, or other governmental entity willing to clean up these wastes.
- G. Many Navajo Nation Chapters have expressed serious concerns about the Activities occurring within Navajo Indian country.
- H. The Navajo Nation finds it necessary and desirable to require that appropriate agencies of the Navajo Nation receive no less than four days advance notice by any carrier of any Products (as defined herein) who is intending to transport such Products on Navajo Nation lands or otherwise within Navajo Indian country, and that such notice be given in accordance with federal rules applicable

to such notice to a state governor and/or to local law enforcement official in order that proper emergency measures may be taken by the Navajo Nation.

- I. The Navajo Nation finds it necessary and desirable to ensure that any future Activities occurring within, on or over Navajo Indian country are performed in a manner that protects the Navajo Nation environment and water resources, the health and safety of Navajo citizens and guests and visitors alike, and the welfare of the Navajo Nation, and responsible regulation by Navajo agencies under Navajo law is the most appropriate manner to ensure such protection.
- J. The Navajo Nation finds that the Navajo Nation Environmental Protection Agency should be authorized, after meaningful consultation with the Navajo Nation Division of Public Safety and subject to the approval of the Resources and Development Committee, to promulgate regulations to implement this Act, for developing and modifying reasonable license fees, bonding requirements, route restrictions, curfews and other terms and conditions for conducting any Activities on or across Navajo Nation lands or otherwise within Navajo Indian country.
- K. Nothing in this Act is intended, nor shall it be construed, to repeal, in whole or in part, the Dine' Natural Resources Protection Act (DNRPA). In the event of any inconsistency between this Act and The DNRPA, the provisions of the DNRPA shall control.

§ 1305. Definitions

- 1. "Activities" means exploration, mining, production, processing, milling and/or transportation of the Products as defined below.
- 2. "Indian Country" shall have the same meaning as that term is defined in 18 U.S.C. §1151.
- 3. "Navajo Indian Country" shall mean the territory over which the Navajo Nation has criminal, civil and regulatory authority, as defined in 7 N.N.C. §254(A) (2005) and as otherwise not limited by applicable federal law.

4. "Navajo Nation Lands" means land held in trust for the Navajo Nation or any Band of the Navajo Nation by the United States, land owned in fee by the Navajo Nation, and Navajo trust allotments in which the Navajo Nation owns any undivided fractional beneficial interest.
5. "Products" means singly or in combination uranium ore, yellowcake, radioactive waste and other radioactive products other than those used for medical purposes.

§ 1306. Statement of Policy

- A. The Navajo Nation opposes generally the transportation of Products over, on, under and across Navajo Nation lands or otherwise over, under or across Navajo Indian Country, except for purposes of transporting Products currently left within the Navajo Nation from past Activities for disposal at an appropriate long-term facility outside of Navajo Indian Country or at an appropriate temporary facility within Navajo Indian country and approved by the Navajo nation Environmental Protection Agency. The Navajo Nation generally opposes the transportation over, on, under or across Navajo Nation lands or otherwise within Navajo Indian country of any equipment, vehicles, person and materials to be used in conjunction with such current or future Activities where such Activities are conducted or to be conducted on or under the surface of or adjacent to Navajo Nation lands or where such Activities may affect surface or ground waters of the Navajo Nation.
- B. The Navajo Nation may permit and regulate transportation of Products pursuant to its right to protect the health, safety, welfare and environment of the Navajo Nation, its citizens, visitors and guests and pursuant to its right to exclude and to condition entry of non-members onto Navajo Nation lands and other lands within Navajo Indian country.

§ 1307. Transportation Notice and Other Requirements

- A. No person or entity may transport any Products on or across Navajo Nation lands or otherwise within Navajo Indian country unless such person or entity complies with the requirements of this section and applicable federal law.

- B. Such person or entity shall give at least four days advance notice of its intent to transport any Products on or across Navajo Nation lands or otherwise within Navajo Indian country to the Executive Director of the Navajo Nation Environmental Protection Agency and to the Director of Public Safety.
- C. Such notice shall be given in conformity with the procedures established under federal rules governing such notice to a state governor and to local law enforcement official in order that proper preparatory emergency measures may be taken by the Navajo Nation.
- D. Such notice shall be accompanied by a reasonable license fee; a showing that adequate bonding or other insurance is in place adequate to protect the Navajo Nation in the event of a spill, disposal or accident; an adequate description of the route to be taken and the vehicles to be used in such transportation; adequate training requirements and assurances that any Navajo Nation curfews for such transportation of any Products shall be honored.
- E. No person or entity may transport across Navajo Nation lands any equipment, vehicles, persons or materials for the purpose of exploring for or mining, producing, processing, or milling any Products on or under the surface of or adjacent to the Navajo Nation lands, or where such Activities may affect surface or ground waters of the Navajo Nation without first:
1. Obtaining Navajo Nation consent and a federal grant of easement Pursuant to the laws of the United States;
 2. Consenting in writing to the full subject matter and personal jurisdiction of the Navajo Nation; and
 3. Agreeing to terms and conditions deemed reasonable and appropriate by the Navajo Nation. Such terms and conditions shall, at a minimum, include the clean-up and remediation in accordance with the more stringent of applicable federal or Navajo law, of any uranium contamination on any parcel of Navajo Nation

lands that degrades the Navajo environment and/or poses a risk to the health and safety of Navajo citizens provided such person, entity, affiliate, subsidiary, partner, co-venturer, agent, contractor (including all subcontractors) or other related party, and/or proposed user of the right-of-way is, under any applicable Navajo or federal statute, regulation or order wholly or partially responsible for the clean-up of the contamination.

Notwithstanding the foregoing, this subsection (E) shall not apply to the transport of any such equipment, vehicles, persons or materials over any federal, state, or county highway or road for which a right-of-way has been approved by the Navajo Nation and a grant of easement has been issued by the Secretary of the Interior or his or her authorized delegate.

- F. The Navajo Nation Environmental Protection Agency shall promulgate, after meaningful consultation with the Navajo Nation Division of Public Safety and subject to the approval of the Resources and Development Committee, regulations necessary or desirable to implement this section, including the establishment of notice requirements, designation of reasonable license fees, bonding requirements, route restrictions and curfews for the transportation of any Products on Navajo Nation lands or otherwise within Navajo Indian country; provided, however, that the minimum requirements of subsection (E) of this section shall be self-executing and shall not require regulations in order to be effective as of the effective date of these amendments.

2. Effective Date

The provisions of these amendments shall become effective in accordance with 2 N.N.C. §221 (B).

3. Codification.

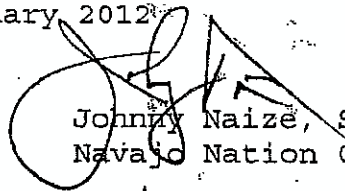
The provisions of this legislation which add or amend sections of the Navajo Nation Code shall be codified by the Office of Legislative Counsel.

4. Savings Clause.

Nothing in this Act is intended, nor shall it be construed, to repeal, in whole or in part, the Dine' Natural Resources Protection Act (DNRPA). In the event of any inconsistency between this Act and the DNRPA, the provisions of the DNRPA shall control. If any provision of this legislation is held invalid by the Navajo Nation Supreme Court, or unappealable order of any court of competent jurisdiction, those portions of this Act which are not determined invalid shall remain in full force and effect.

CERTIFICATION

I hereby certify that the foregoing resolution was duly considered by the Navajo Nation Council at a duly called meeting in Window Rock, Navajo Nation (Arizona) at which a quorum was present and that the same was passed by a vote of 18 in favor and 0 opposed, this 16th day of February 2012.



Johnny Naize, Speaker
Navajo Nation Council

Mar 01, 2012
Date

Motion: Honorable Katherine Benally
Second: Honorable Jonathan Nez

ACTION BY THE NAVAJO NATION PRESIDENT:

- I hereby sign into law the foregoing legislation, pursuant to 2 N.N.C. §1005 (C)(10), on this _____ day of MAR 07 2012 2012.


Ben Shelly, President
Navajo Nation

2. I hereby veto the foregoing legislation, pursuant to 2 N.N.C. §1005 (C) (11), this _____ day of _____ 2012 for the reason(s) expressed in the attached letter to the Speaker.

Ben Shelly, President
Navajo Nation

Appendix 4: McKinley Community PLACE MATTERS: Focus Group/Interview Questions

BACKGROUND

Population: The primary target area for the focus groups was the communities of Red Water Pond Road, Church Rock, Manuelito, Crownpoint, and Tsayatoh. We conducted interviews in these communities, as well as from other community members in Eastern Navajo Agency and the City of Gallup.

Target Number of Participants: We will be conducting 4-5 focus groups with approximately 8 to 12 participants and approximately 20-25 interviews with community members if not more given the interest in this assessment.

Length of Focus Groups or Interviews: 1 to 1.5 hours per interview and 2 to 2.5 hours for focus groups

Incentives: There will be snacks available during the focus groups and interviews.

FOCUS GROUP/INTERVIEW SCRIPT

Introduction: Thank you for agreeing to participate in this focus group or interview.

Who are we: McKinley Community PLACE MATTERS team seeks to change systems that perpetuate environmental health disparities related to the impacts of institutional racism and multi-generational trauma, by empowering participating communities within the county to impact equitable policy change.

Purpose: Our Health Impact Assessment (HIA) of additional studies will address health broadly and be culturally sensitive instead of focusing solely on physical or disease related issues.

Policy: We are conducting a HIA to analyze how additional studies on uranium mining in McKinley County will affect the physical, emotional, economic and spiritual health of communities.

Our goal: To create a narrative about the health impact of uranium mining and ensure, to the best of our ability, that harm to the community is not reproduced. Your thoughts and participation will be used in a report that will raise awareness about the potential risks of future mining.

Timing: We expect our HIA to be completed around late September. At this time, the community will use the results to have discussions with decision makers about the health impact of uranium mining.

Why you? You have been invited because you live in McKinley County and/or in proximity to the Church Rock Tailing Spill or abandoned mine sites.

Confidentiality:

- Participation is completely voluntary – people can leave any time.
- Discussion is confidential to the best of our ability – we will not report/describe comments by name and will keep no records of participants beyond the verbal/signed confidentiality agreement.
- Do not need to state full name.
- The final HIA report will have data from many sources – not just these focus groups or interviews that we are doing with different people.

Discussion

- There are no right or wrong answers so please feel free to be totally honest. We appreciate your input, and want to hear from all of you about experiences at work and how those experiences might relate to your health.
- Hope the information can help identify health impacts of uranium mining.

Process

- We anticipate a 1 to 1.5 hours for interviews and 2 to 2.5 hours for focus groups.
- We will ask broad questions and really want to hear your thoughts.
- My role is to guide the discussion – focus on some questions and let people tell their stories.
- Not everyone has had the same experience, which is why this is so valuable, but also why we want to remind everyone to respect others' experiences.
- We will be talking together for the period of time.
- If folks agree, we may audiotape or videotape the information after introductions.
- Handout sheet with my contact information as well as the consent form signed.

General

1. Can you please share your experience or knowledge of the 1979 Church rock Tailing Spill?
2. What community/neighborhood do you consider yourself living in?
3. How long has your family lived in the area?

Community Efficacy

1. How much have you participated in any uranium mining decision-making process?
 - a. For example, when a mine is going to be opened and there are public hearings?

- b. For example, attending meetings when a mine/area is going to be cleaned up because of contamination?
 - c. For example, what written letters have you provided to decision makers, for public comments, etc.?
 - d. In what ways have you participated in talking to decision makers?
- 2. To what extent do you trust decision-makers/government agencies to make decisions about mining in your area/community?
Probes:
 - a. For example, how do you feel your health and well-being are being considered?
 - b. Do you feel you can talk to people who work in government agencies about your concerns openly and honestly?
 - c. Can you give examples of when you feel like decisions were made in your interest? Not made in your interest?
- 3. In what ways do you feel you have the power to inform a decision-making process around mining?
Probes:
 - a. Do you feel you are listened to?
 - b. Who do you feel has power and what makes you feel this way?
 - c. What ultimately goes into the decision-making process?

Cultural Relevance

- 4. In what ways do you feel decision makers understand the importance of the land to communities and their overall health?
Probes:
 - a. How have you seen that discussed by decision makers?
 - b. In what ways do they make connections between uranium mining and health?
 - c. In what ways do you think there are connections to health? Has this varied over time?
- 5. To what extent do you think the fundamental laws are being considered in relation to decisions about uranium mining?
Probes:
 - a. What is usually considered? Not considered?
 - b. Can you provide examples? Has this changed over time?
- 6. To what extent have you noticed cultural knowledge and teachings being discussed and shared in public meetings and decision-making process regarding uranium mining?
Probes:
 - a. How do you feel cultural teachings could be relevant for decision makers?
 - b. Can you provide examples? Where are there gaps (i.e. missing pieces)?

Displacement/Relocation

7. Can you share any experiences you and/or community members have had with land/vegetation being moved for clean up?

Probes:

- a. Specific stories about what happened?
- b. How is the land being used?
- c. How have you felt about the experience?

8. Do you feel your health and/or mental health was impacted by these experiences of land being moved for remediation? For example, exposure to pollutants, stress, substance abuse.

Probes:

- a. In what ways? For better or worse?

9. Have you had experiences - either directly or indirectly - with relocation because of land remediation? Was adequate housing offered during the remediation process?

Probes:

- a. Specific stories about what happened?
- b. Was it a good process? What could have been improved?
- c. If housing was not offered, how did you find an alternative?
- d. What is your vision for how housing issues could be addressed in the remediation process?

10. In what ways have the use of traditional medicines or sacred sites been impacted by uranium mining?

Probes:

- a. Any stories of before and after regarding the medicines or sites?
- b. Increased? Decreased?
- c. Concerns that you would have about the impact to medicine or sites?

Environmental Contamination and Pollution

11. What is your sense of the pollution issues related to active and inactive mines? What are the main environmental and health issues you are concerned about?

Probes:

- a. For example, asthma, cancer, other respiratory ailments, stress, mental health, etc.
- b. Are there specific stories that you want to share about these issues?

12. To what extent do you feel the larger community is knowledgeable about the pollutants and potential health issues at inactive and active mining sites?

Probes:

- a. Has this changed over time?

Appendix 5: The following graphs illustrate the contaminants extracted from wells in the following areas: Southwest Alluvium, Zone 1 and Zone 3. ⁵⁶

⁵⁶ UNC 2013 Groundwater Corrective Action Annual Review Report

Southwest Alluvium Contaminants Extracted Exceeding Recommended U.S. EPA levels (1 or more wells)

| 1989 | 2001 | 2013 |
|------------------------------|------------------------------|------------------------------|
| Gross Alpha | Chloride | Chloride (mg/l) |
| Lead-210 | Manganese | Manganese |
| Sulfate - SO4 | Sulfate - SO4 | Nickel |
| Thorium | Total Dissolved Solids – Lab | Sulfate - SO4 |
| Total Dissolved Solids - Lab | | Total Dissolved Solids - Lab |
| | | Uranium |

Zone 1 Contaminants Extracted Exceeding Recommended U.S. EPA levels (1 or more wells)

| 1989 | 2001 | 2013 |
|------------------------------|------------------------------|------------------------------|
| Aluminum | Aluminum | Chloride |
| Chloride | Chloride | Cobalt |
| Cobalt | Cobalt | Manganese |
| Gross Alpha | Manganese | Nickel |
| Lead | Molybdenum | Radium-226 and 228 |
| Lead-210 | Nickel | Sulfate - SO4 |
| Manganese | Radium-226 and 228 | Total Dissolved Solids - Lab |
| Molybdenum | Sulfate - SO4 | Total Trihalomethanes |
| Nickel | Total Dissolved Solids – Lab | |
| Radium-226 and 228 | Total Trihalomethanes | |
| Sulfate - SO4 | | |
| Total Dissolved Solids - Lab | | |

Zone 3 Contaminants Extracted Exceeding Recommended U.S. EPA levels (1 or more wells)

| 1989 | 2001 | 2013 |
|----------------|-------------|-------------|
| Cobalt | Aluminum | Aluminum |
| Lead | Arsenic | Beryllium |
| Manganese | Beryllium | Cadmium |
| Molybdenum | Cadmium | Cobalt |
| Nickel | Cobalt | Gross Alpha |
| Radium-226 and | Gross Alpha | Lead-210 |

| | | |
|----------|------------------------------|------------------------------|
| 228 | | |
| Selenium | Manganese | Manganese |
| | Nickel | Nickel |
| | Radium-226 and 228 | Radium-226 and 228 |
| | Total Dissolved Solids - Lab | Sulfate - SO ₄ |
| | Vanadium | Thorium - 230 |
| | | Total Dissolved Solids - Lab |
| | | Uranium |
| | | Vanadium |

Appendix 6: Assessment Results and Efforts to Cleanup AUMs in the Eastern Navajo Region

| | |
|---|---|
| Number of U.S. EPA response actions | 5 response actions are for mine sites in Eastern Navajo Region: NECR (PRP-GE/UNC), Mariano Lake (PRP-Chevron USA), Quivera (PRP-Rio Algom), Section 32 and 33 (PRP-Tronix, Inc.), and Ruby Mines 1-4 (PRP-Freeport McMoRan). |
| Total number of AUMs in Eastern Navajo Region | 84 |
| Planned amount of soil removed from the NECR mine | 1 million cubic yards (based on 2011 removal action plan) |
| Amount of contaminated soils removed from the NECR mine | <p><i>2007</i>, 6,000 cubic yards of contaminated soil from yards of adjacent residences (1st interim cleanup).</p> <p><i>2009</i>, greater than 110,000 cubic yards of contaminated soil around the NECR mine. Waste consolidated on the existing mine waste pile which was re-graded and covered to prevent further migration of waste prior to final cleanup of the mine site (2nd interim cleanup).</p> <p><i>2011</i>, discovery of contaminated soil outside of NECR mine fence line – fence installed.</p> <p><i>2012</i>, GE removed 30,000 cubic yards of contaminated soils and moved it to existing waste pile at NECR and covered with clean soil (3rd interim cleanup).</p> <p><i>Total cleanup</i>: 146,000 cubic yards of contaminated soil (6,000 + 110,000 + 30,000).</p> |
| Amount of contaminated soils removed | <i>2012</i> , 15,000 cubic yards of |

| | |
|--|--|
| from Quivera mines site | contaminated soil removed by Rio Algom (responsible party for Quivera mines) and placed on waste pile currently located at Quivera mines. Final cleanup at Quivera 2016-2020. |
| Number of unregulated water sources exceeding drinking water standards | 3 wells in Church Rock area |

Current Efforts to Cleanup Environmental Contamination on the Navajo Reservation More Broadly

Prior to 2007, the DOE led the largest effort to cleanup contamination with cleanup actions at four uranium mill sites and groundwater monitoring at three of the four sites. From the 1970s to the mid-2000s, the U.S. EPA surveyed 65 structures and replaced 2 structures that had elevated levels of radiation. Tribal agencies have sampled unregulated water sources throughout the reservation to identify sources that exceed the standards for radiation, and a Navajo mine reclamation program addressed the physical hazards caused by AUMs by closing ventilation systems and openings to prevent accidents. More recently, a multi-agency effort to assess and cleanup hundreds of structures on the Navajo reservation began in 2007 in response to a hearing before the House Committee on Oversight and Government Reform.

Assessment Results and Efforts to Cleanup AUMs on the Navajo Reservation ²³

Note: Figures include assessment and cleanup efforts occurring in the Eastern Navajo Region.

| | |
|---|---|
| Number of mines assessed | 520 mines assessed from October 2008 – November 2011 |
| Number of mines receiving high priority for cleanup | 45 |
| Number of mines having gamma radiation < 2 x background | 71 |
| Number of mines having gamma radiation > 2 x background | 403 |
| Number of mines having gamma radiation > 2 x, but < 10 x, background | 177 (U.S. EPA recommends, “residents should not build homes, corrals or other structures, and should not gather building materials from these sites”) |
| Number of mines having gamma radiation > 10 x background | 226 (U.S. EPA recommends, “residents should stay away from areas”) |
| Number of mines having gamma radiation > 2 x background and within ¼ mile of an inhabited structure | 70 |
| Number of mines having > 2 x | 5 |

| | |
|---|--|
| background and located within 200 feet of an inhabited structure | |
| Number of mines having gamma radiation > 10 x background and within ¼ mile of an inhabited structure | 36 (Note: U.S. EPA is conducting response actions at 9 of the 36). As of April 2014, two additional mines had been added to the 36. |
| Number of mines potentially impacting streams | 7 |
| Number of U.S. EPA response actions | Response actions at 9 mine sites (2007-2012). 5 of 9 mine sites are in Eastern Navajo Region: NECR (PRP-GE/UNC), Mariano Lake (PRP-Chevron USA), Quivera (PRP-Rio Algom), Section 32 and 33 (PRP-Tronix, Inc.), and Ruby Mines 1-4 (PRP-Freeport McMoRan). |
| Number of structures assessed | As of April 2014, 1,020 structures have been assessed. |
| Number of structures needing remediation | 43 |
| Number of structures remediated | 34 |
| Number of yards having contaminated soil | 18 |
| Percentage of Navajo population receiving drinking water from unregulated source (e.g., livestock wells, springs, private wells, watering points) | 30% |
| Number of unregulated water sources tested | 240 |
| Number of unregulated water sources exceeding drinking water standards for uranium or radionuclides | 29 |
| Number of wells shut down due to high radiation levels | 3 |

Future Efforts to Cleanup Environmental Contamination in the Eastern Navajo Region-NECR Mine

Navajo people, advocates, scientists, and the Navajo Nation object to U.S. EPAs decision to dispose of 870,000 cubic yards of NECR mine waste in a lined disposal cell on top of an unlined cell at the former UNC mill (alternative 5A), located a short distance away (Helms, 2009). According to George Arthur, Navajo Nation Resources Committee Chairman, "If the federal government can move 16 million tons of uranium mill tailings away from the Colorado River near Moab, Utah, it can remove

the contamination from Church Rock.” Stephen Etsitty, executive director for Navajo U.S. EPA, stated, “it was articulated on July 16 by (Navajo) President Shirley, where to the fullest extent possible, we’re going to work toward our goal of having all these uranium contaminated materials removed completely out of Navajo Indian County. We’ve been pushing for Option 2 from the beginning and that’s our preferred option.”²⁵

In response to these concerns, U.S. EPA responded that they didn’t think removal outside of reservation boundaries was the best choice. Andrew Bain, remedial project manager for U.S. EPA, stated, “I want to point out that there are significant greenhouse emissions with taking these materials. It’s about a 1,400 mile round trip to the U.S. Ecology facility in Grandview, Idaho.” In response, Sofia Martinez of the Southwest Research and Information Center, stated, “The carbon footprint doesn’t seem to be as important when it’s waste coming into New Mexico, but when it’s going out of New Mexico, it becomes a real big issue.” (Helms, 2009). GE, parent company of UNC, would need to pay \$293.6 million to move the wastes outside of reservation boundaries. GE would only pay \$44 million to move wastes to the UNC mill. GE’s 1st quarter 2009 earnings were \$2.8 billion.²⁵

Adding to the climate of distrust around the decision to place the mine wastes at the mill site is that the DOE would be responsible for monitoring leaks in the disposal cell over the next 1,000 years. Recall that the DOE was formerly the Atomic Energy Commission and the primary financier of uranium production on the Navajo reservation.

Costs for Cleanup of Environmental Contamination

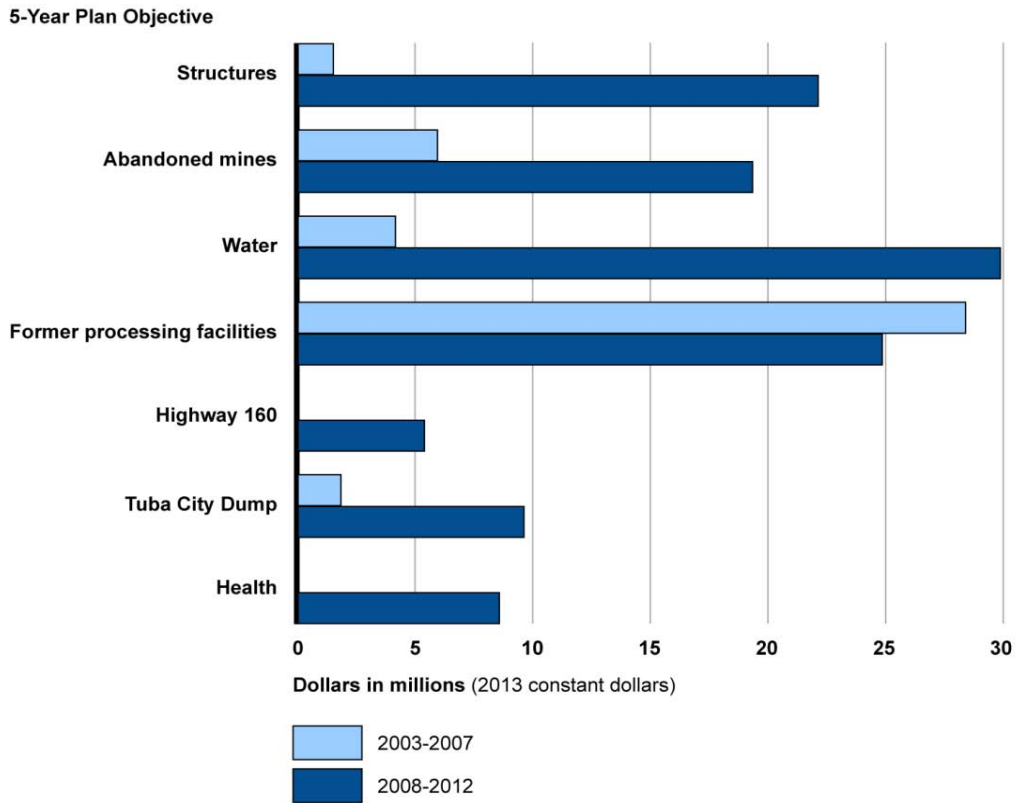
Costs for assessment and cleanup of uranium contamination occurring during the multi-agency five-year effort (2007-2012) are presented in Table 5 (GAO, 2014). Figure 3 provides federal government expenditures, by type, for assessment and cleanup efforts before and after the multi-agency five-year effort (GAO, 2014).

Costs Associated with Multi-Agency 5-year Assessment and Cleanup Effort

| | |
|-----------------------------------|--|
| Costs for water infrastructure | \$26.7 M for 14 projects to provide water to 808 homes. Improved water quality for 1,017 homes though improved Sweetwater transmission main extension (total 1,825 = 1,017 + 808). \$2.6 M for water hauling program to serve 3,000 residents of remote areas – began in 2011, as of 2013, 328 homes being served. Church Rock scattered sites 1/12 complete 4 homes served. |
| Total costs by agency, as of 2012 | U.S. EPA: \$50.9 M BIA: \$7.6 M |

| | |
|---|---|
| | DOE: \$29.4 M Indian Health Services (IHS): \$16.0 M Agency for Toxic Substances and Disease Registry (ATSDR): \$5.5M Total: \$109.4 M |
| Costs to remediate structures | U.S. EPA: \$22 M |
| Cost of work associated with multi-agency 5-year plan (2007-2012) | \$110 M (government agencies), \$121 M quoted in 2014 GAO report. \$17 M (responsible parties) |
| Cost of work associated with 5-year plan for the NECR mine | > \$4 M (U.S. EPA) > 6 M (GE/UNC, with 1/3 reimbursed to GE/UNC by DOE/Department of Interior (DOI)) |
| Costs of future water infrastructure | 36 economically feasible drinking water projects would cost about \$35 million. |

Federal Agency Expenditures on Actions Taken to Address Uranium Contamination on or Near the Navajo Reservation, 2003-2007 and 2008-2012



Source: GAO analysis of agencies' data.

Appendix 7: U.S. EPA's written responses to culturally appropriate outreach and information exchange efforts.

1. Which culturally appropriate practices were used when conducting public meetings and developing documents referencing uranium mining, remediation, voluntary displacement activities?

Meetings:

- Opening meetings with a Navajo prayer by a community member.
- Allowing community members to speak about any topic of concern without a time limit.
- Using visual depictions as much as possible.
- Hiring interpreters for larger public meetings.
- Attending smaller community meetings with a Navajo speaker from U.S. EPA or Navajo U.S. EPA, whenever possible.
- Contributing food to meetings (not funded by U.S. EPA, but brought as a personal contribution by U.S. EPA staff).
- Hiring a Navajo Peacemaker as a meeting facilitator.
- Passing documents in a clockwise direction.
- Attending meetings with a Navajo U.S. EPA representative.

Voluntary Housing:

- Providing financial support for traditional ceremonies when residents are moving, as appropriate for each household.
- Providing mileage costs for families who have to care for local livestock.
- Maintaining individual privacy in housing discussions.
- Sensitivity to privacy concerns related to press events and press relations.

Remediation:

- Involving the community in cultural surveys and re-vegetation efforts.
- Testing of corn plots for agronomic indicators that could have impacted the growth of corn.

Documents:

- Soliciting Navajo U.S. EPA review of U.S. EPA public documents for communities.
- Using plain language consistent with our plain language initiative found at <http://www.U.S.EPA.gov/plainwriting/index.html>.

2. Were all public meetings and prepared documents in the language of the population most impacted, and if so, how frequently were public meetings and documents provided in a language other than English?

Meetings:

While U.S. EPA public or community meetings are all conducted in English, U.S. EPA strives to ensure that a Navajo speaker is available to translate, as appropriate. U.S. EPA hires local Navajo interpreters at larger public meetings or education sessions. Interpreters have either offered simultaneous translation to a few individuals or

have periodically provided translations during meetings at the request of individuals.

At less formal meetings in the homes of community members, U.S. EPA technical staff typically attends with a Navajo speaking representative either from Navajo U.S. EPA or U.S. EPA. The U.S. EPA Community Involvement Coordinator currently assigned to work with this community is fluent in the Navajo language. Since U.S. EPA works collaboratively with Navajo U.S. EPA and coordinates our field visits and community meetings with a Navajo U.S. EPA representative, many whom speak the Navajo language, it is rare that a U.S. EPA representative would meet with communities without a Navajo speaker present who is familiar with the details of the Superfund Site.

Documents:

U.S. EPA has not prepared technical or informational documents in the Navajo language other than providing brief translations on physical signs posted at mine sites or contaminated wells.

Navajo U.S. EPA has informed U.S. EPA that since Navajo communities primarily utilize the spoken Navajo language, communicating with communities in spoken Navajo is most effective. Neither the community members nor Navajo U.S. EPA has requested that U.S. EPA provide written materials in the Navajo language or suggested that it would be helpful to increase understanding.

3. Were public meetings held at community venues that were accessible to the impacted community, and if so, when and how frequently?

The community holds monthly meetings in their homes, which U.S. EPA supports financially and attends periodically. U.S. EPA has also held public meetings, hearings, listening sessions, groundwater education sessions, and workshops at the Pinedale and Church Rock Chapter Houses, the Gallup library, and hotel conference rooms in Eastern Gallup. U.S. EPA typically discusses potential venues with the community before selecting a location to best suit their needs.

4. Were documents, in the language of the impacted community, available at community venues to achieve maximum accessibility?

Navajo U.S. EPA has informed U.S. EPA that since Navajo communities primarily utilize the spoken Navajo language, communicating with communities in spoken Navajo is most effective. Neither the community members nor Navajo U.S. EPA have requested that U.S. EPA provide written materials in the Navajo language or suggested that it would be helpful to increase understanding. Therefore, U.S. EPA has not provided documents in the written Navajo language. However, U.S. EPA does provide hard copies of documents produced in English related to the Superfund Cleanup process for the local Superfund Sites to a member of the RWPR community who maintains a local library of these documents. U.S. EPA also maintains a public information repository of Administrative Records produced for

these Sites at the Octavia Fellin Public Library in Gallup, NM and the Navajo Nation Library in Window Rock, AZ.

5. What was the extent of public outreach? For example, how many impacted community members were reached, how frequently, was the information provided understood - was there any mechanism to evaluate the effectiveness of the information (e.g., pre or post-knowledge surveys)?

There are several mechanisms in place for U.S. EPA to contact local residents. When U.S. EPA advertises for larger public meetings, we do so in two local newspapers, including the Gallup Independent and the Navajo Times. In addition, we have used the Navajo radio stations to advertise information related to these sites. These announcements are in both English and Navajo. We have also distributed information via e-mail to various stakeholders including Navajo residents, Navajo Nation employees, the press, and local, state, and federal political representatives. We have also in the past put fliers in the mailboxes in the local Chapter Houses or posted them on the Chapter House boards.

For working more directly with the most affected residents living next to the sites, we primarily communicate with the Red Water Pond Road Community Association (RWPRCA), which includes approximately 75 residents living closest to the NECR and Quivera mine sites and the UNC Mill as well as their extended family and other local residents. The RWPRCA, a non-profit organization, receives funding from U.S. EPA to help facilitate distribution of information from U.S. EPA to local residents and chapter officials through their community meetings, document distribution, and word of mouth. Similarly, the Association helps bring concerns of the local community about activities related to the NECR and Quivera Mine Sites to U.S. EPA's attention in a timely manner. The RWPRCA has estimated that 250-300 individuals are living within two miles of the NECR Mine Site.

U.S. EPA has monthly calls with the RWPRCA Executive Committee Members, Navajo Nation U.S. EPA, and the U.S. EPA's Technical Assistance Services for Communities (TASC) contractor. The TASC contractor calls the Executive Committee Members prior to each call to remind them of the call and ask what they would like to discuss on the call. The TASC contractor also attends monthly community meetings, which are funded through the RWPRCA contract. During these meetings, the TASC contractor reports back to the community on outstanding community questions and takes new questions back to U.S. EPA. The TASC contractor occasionally provides more in-depth presentations on topics of community interest.

A design review team has also been formed to coordinate the design review process among the various agencies involved in the NECR cleanup. The design review team currently consists of USU.S. EPA Regions 6 and 9, the Nuclear Regulatory Commission (NRC), Navajo U.S. EPA, the New Mexico Environmental Department (NMED), and the Department of Energy (DOE) as well as a representative from the community assisted by a technical support representative from the TASC contract

administered by USU.S. EPA. The community representative participates in additional calls with the TASC representative and U.S. EPA's design team lead in our technical support section. These smaller follow-up calls to the design team meetings allow for additional time to review and discuss information in technical documents and to provide answers to any questions about the documents or design team discussions. Periodically, the community representative will report back to the community about various technical aspects of the project and will get input from the community about any concerns or information they may have. The community representative is supported by the TASC representative in this effort to bring back information to the broader community and has provided visual aids to help with the technical discussions.

U.S. EPA has not used a formal evaluation mechanism for evaluating the effectiveness of our communication, however, the TASC contractor regularly checks in with the community by phone or in person to make sure that E PA is responding to the topics of concern to the community.

6. How was public input from the impacted community, particularly from minority populations, received, considered, and part of the decision-making process? How many minority individuals provided public input? Was the mechanism for public input easy to understand and to undertake?

Community input was received both in writing and verbally at public meetings, public hearings, smaller community meetings, as well as by letters and through individual discussions with stakeholders. Input was received from various community groups, stakeholders, and other Federal, State and Tribal agencies including the Red Water Pond Road Community Association (RWPRCA), Navajo Nation Environmental Protection Agency (NN U.S. EPA), U.S. Department of Energy (DOE), New Mexico Environment Department (NMED), New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), Southwest Research and Information Center (SRIC), Bluewater Valley Downstream Alliance (BVDA), National Mining Association (NMA), U.S. Nuclear Regulatory Commission (NRC), Southwest Network for Environmental & Economic Justice (SNEEJ), Multicultural Alliance for a Safe Environment (MASE), New Mexico Environmental Law Center, University of New Mexico's College of Pharmacy and United Nuclear Corporation-General Electric (UNC/GE). Public hearings were well attended by local Navajo residents.

When it was clear that the community opposed the proposed alternative for the NECR cleanup, rather than issue the Action Memo immediately, U.S. EPA took a break to address community concerns about the proposed alternative. U.S. EPA hired a Navajo Peacemaker to facilitate community meetings, organized a tour of a similar mine for two board members of the RWPRCA, took time to investigate some of the community concerns and provide more information about groundwater and other disposal facilities, and organized listening sessions, a health and risk

workshop, and informational sessions about topics such as re-vegetation and ongoing investigations.

U.S. EPA's written responses to all concerns raised are included in the September 29, 2011 Northeast Church Rock Mine Non-Time Critical Removal Action at:

<http://yosemite.U.S.>

EPA.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/da385d730c752bb98825791a006e62c9!OpenDocument

U.S. EPA's written responses to all concerns raised on the U.S. EPA Region 6's, March 29, 2012 Record of Decision for the UNC Site are located at: <http://www.U.S.>

EPA.gov/region6/6sf/newmexico/united_nuclear/06-681353-unc-rod.pdf

In addition, U.S. EPA met with the RWPRC immediately prior to the public announcement of the Action Memo to distribute a fact sheet about the decision and discuss the ways community input had influenced the details of the cleanup alternative.

Examples of how community interests were considered in U.S. EPA's cleanup plan for NECR:

- Provide unlimited surface use of the mine site after cleanup
- Use the most stringent uranium mine cleanup standard in the country
- Specify a cap and liner system at the United Nuclear Corporation (UNC) site to ensure that the mine waste does not affect people and the environment
- Send waste containing high levels of radium or uranium off-site for reprocessing or approved disposal
- Clean up a contaminated drainage in the residential area east of Red Water Pond Road
- Provide voluntary housing options during the cleanup for community members living near the mine
- Provide job training and employment during the cleanup
- Coordinate the NECR cleanup with the cleanup of the Quivera Mines

In addition, if NRC issues their license amendment for this project, United Nuclear Corporation/General Electric (UNC/GE) has agreed to:

- Hire locally through a Navajo hiring preference
- Provide a scholarship program for Navajo students to attend the University of New Mexico or Arizona State University
- Improve Pipeline Canyon Road near the area of the mine and mill sites
- Provide building materials for ceremonial hogans requested by the RWPRC.

7. What was the reading level of the documentation provided, how easy was the documentation understood, how was technical information presented.

U.S. EPA strives to keep public document writing as simple as possible, consistent with our plain language initiative found at <http://www.U.S.>

EPA.gov/plainwriting/index.html. U.S. EPA particularly focuses on using plain

language in our websites and fact sheets. While the information in technical documents provides a challenge to keeping language below a high school reading level, U.S. EPA still attempts to use plain language in these documents as much as possible.

The TASC contractor (who works primarily with the RWPRCA) also uses plain language for all of its written products (e.g., presentations, fact sheets). In general, that means that 0 to 5 percent of sentences are passive voice; there are 15 to 17 words per sentence; there are 50 to 70 words per paragraph; and the overall reading level is between grades 8 and 12. TASC strives for an 8th grade reading level, but this is difficult because of the technical nature of the subject matter.

Both U.S. EPA and its contractors use visual aids when possible to help explain technical information. U.S. EPA Region 6 has held several groundwater education sessions at chapter houses where they have used hands on demonstrations to help illustrate concepts such as soil water content or pH levels. U.S. EPA intends to help facilitate understanding of groundwater issues at the UNC Mill Site with these type of hands on demonstrations. When presenting information to the community at their monthly meetings, the TASC contractor typically begins with some review of previous information, then brings in new information, then reviews, then answers questions. The TASC contractor makes an effort to speak clearly and use plain language when talking with community members.

8. What was the extent of awareness among community residents on the impacts of uranium mining and exposure on health? What were the specific actions taken to raise awareness between uranium exposure and health effects among the impacted community by U.S. EPA?

On March 30, 2010, U.S. EPA organized a Health and Risk Workshop to try to address concerns raised by local community members. The workshop was held at the Church Rock Chapter House and panelists included: Henry Tso, Medicine Man Association, Andrew Bain and Daniel Stralka, U.S. EPA, Michele Dineyazhe, NN U.S. EPA, Libby Vianu, Agency for Toxic Substances and Disease Registry (ATSDR), Dr. Douglas Zang, Indian Health Service (IHS), and Johnnye Lewis, University of New Mexico (UNM) Dine Network for Environmental Health (DiNEH) Project.

U.S. EPA has also participated in efforts with the Indian Health Service (IHS) and the Agency for Toxic Substances and Disease Registry (ATSDR) to develop posters for local IHS health clinics. These posters include maps and information about the uranium mines and contaminated wells as well as information about associated health risks due to exposure to uranium. U.S. EPA, IHS, and ATSDR recently put on a training for over 100 Community Health Workers from around the Navajo Nation about the posters to educate the Health Workers about the health issues related to uranium mining so they can help to educate local communities.

There have been several additional efforts by U.S. EPA and federal health agencies to address health education and awareness. The Navajo Area Indian Health Service has a non-occupational health monitoring program and is holding health fairs around the Navajo Nation. U.S. EPA attends the Health Fairs whenever possible to

conduct outreach about the uranium mines. In the development of their health monitoring program, to better understand the health concerns of the local community, IHS held a round table discussion on community health issues at the Church Rock Chapter house. This round table was attended by Navajo U.S. EPA and U.S. EPA representatives as well as representatives from the RWPRCA. IHS then held one of their first health fairs in the Church Rock area. Local residents have been participants of both the IHS health monitoring program as well as the Navajo birth cohort study, conducted by the University of New Mexico, SRIC, and the Agency for Toxic Substances and Disease Registry, Navajo Nation Department of Health and the Navajo Area Indian Health Service, which looks at birth outcomes and child development in several Navajo areas.

9. What was the extent of awareness and understanding among the impacted community on the steps necessary to remediate mining sites. How were culturally appropriate practices implemented during voluntary displacement and required remediation?

U.S. EPA has discussed the NECR mine cleanup process numerous times with the RWPRCA. To provide a visual aid to explain the cleanup process, U.S. EPA recently created a figure depicting the steps in the process to clean up the Northeast Church Rock Mine Site. U.S. EPA has used this figure to discuss the status of the NECR cleanup in person at community meetings we attended over the past few months. In addition, U.S. EPA has scheduled a community training about the Superfund cleanup process in Gallup in February at the request of the community. The second question is answered as part of Question 1.